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# **Original Communications**

A SURVEY OF CESAREAN SECTION IN THE BOROUGH OF BROOKLYN, CITY OF NEW YORK\*

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I<sup>N</sup> 1926, the Brooklyn Gynecological Society decided to undertake an investigation into the indications for which cesarean section was being done in the Borough of Brooklyn, City of New York.

On the Survey Committee were Drs. Ralph M. Beach, Francis B. Doyle, Harvey B. Matthews, George W. Phelan, Joshua Ronsheim and Charles A. Gordon, Chairman. The results of that study have been analyzed by the Chairman.

Our inquiry was modeled on "The Results of a Collective Investigation into Cesarean Section performed in Great Britain and Ireland from the year 1911 to 1920 inclusive," analyzed by Eardley Holland, in the *Journal of Obstetrics and Gynecology of the British Empire* (Autumn-Winter, 1921).

Professor Holland gave us much help at the beginning of our work and sent us copies of his forms which we have closely followed. Our material, too, is arranged like his, both because we thought his work exceedingly well done, and because paralleling his study would make the details of our analysis more accessible.

Cesarean section has been studied in the hospitals of the Borough of Brooklyn, City of New York, for the years 1921 to 1926 inclusive. All the hospitals in Brooklyn where we believed cesarean section was being done were invited to participate. Blank forms were arranged for convenient tabulation. All the large hospitals and many of the small ones furnished their statistics and cooperation was excellent.

Not all the cesarean sections done in Brooklyn during this period were available for study, as a few of the small private hospitals were

<sup>\*</sup>Presented at a meeting of the Brooklyn Gynecological Society, 1928.

Note: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

unable to supply us with their figures. A specimen sheet and sets of four blanks with space for detailed information were provided. (1) Cases of Contracted Pelvis. (2) Cases of Eclampsia and Other Toxemias of Pregnancy. (3) Cases of Antepartum Hemorrhage (placenta previa and accidental hemorrhage), and (4) Other Conditions. Headings, questions and details were of course the same in every case, and special columns were provided to show the number of hours in labor, whether membranes were ruptured or not, and the number of vaginal examinations made.

The following request accompanied the tables: "Under the heading Condition of patient at time of operation, please state: (1) If patient was in labor or not; (2) How long in labor before operation; (3) Stage of labor; (4) Membranes ruptured or not; (5) Number of vaginal examinations; (6) If forceps delivery or version had been attempted."

TABLE I

	I CONTRACTED PELVIS	II ECLAMPSIA AND OTHER TOXEMIAS OF PREGNANCY	ANTE- PARTUM HEMORRHAGE	IV CONDITIONS OTHER THAN 1, 2 AND 3
Methodist Episcopal	181	40	15	122
Long Island College	89	25	10	89
Jewish	153	7	4	28
Carson C. Peck Memorial	28	9	4	77
Brooklyn	27	11	5	56
St. Catherine's	52	5	9	3
Norwegian	31	19	5	13
King's County	43	4	4	4
Prospect Heights	31	12	5	7
Bedford Maternity	34	_	8	10
St. John's	22	15	3	9
St. Mary's	8	8	6	22
Brownsville and East New Yor	k 24	4	5	8
Samaritan	13	8	2	17
United Israel-Zion	26	3	1	8
Beth Moses	24	2	2	10
Wyckoff Heights	6	6	11	11
Bushwick	17	4	1	10
Greenpoint	21	2	3	3
Midwood	11	4	4	7
Dr. Wade's	15	3	-	5
Cumberland	12	7	_	3
Calendonian	8	2	3	5
Holy Family	7	. 1	-	5
Bethany Deaconesses	8	2	_	3
Unity	12	-	_	
Bay Ridge Sanitarium	7	_	1	2
Williamsburg Maternity	6	1	2	dans.
Brooklyn Hebrew Maternity	6	-	1	1
Coney Island	5	2	1	_
Swedish	6	_	1	1
Riverdale	1	1	_	5
Lutheran	_	î.	1	-
Mutual	_	2	-	-
	934	$\frac{210}{210}$	117	544

"Under Eclampsia please state: (1) How many convulsions before operation; (2) The amount of albumin in urine at time of operation and on discharge; (3) Time between first convulsion and operation; (4) How many convulsions followed operation and when they ceased." "Under Placenta Previa, please state, Variety, i.e., central or cover-

ing os uteri only partially."

In all, the details of 1805 cases were returned to the committee. These cases have been analyzed as fully as the recorded details would permit.

Table I gives a list of the hospitals which returned the forms, with the number of cases in each class.

#### I. CONTRACTED PELVIS

Maternal Mortality.—The number of cases in which cesarean section was performed for pelvic contraction is 934 with a maternal mortality of 54, or 5.8 per cent. Not all the cases of contracted pelvis are included in this group, but only those in which pelvic contraction was given as the indication for operation. Other cases will be found in Group 2, and in Group 4, under the heading of "Previous Sections."

In this group of 934 cases there were 244 women who had been sectioned before; as follows:

One previous section,	202	cases
Two previous sections,	33	6.6
Three previous sections,	8	6.6
Four previous sections,	1	6 6

In 63 cases the duration of labor was not stated, but the remaining 871 may be divided into the following important groups in which the maternal mortality is subdivided:

	TOTAL CASES	DEATHS	PER CENT
A. Not in labor	343	12	3.5
B. Early in labor	110	7	6.4
C. Late in labor	*403	31	7.7
D. After induction of labor	1	0	
E. After attempts at delivery	14	2	13.6

Classes A, D and E are as stated. Class B includes cases very early in labor, indicated as "just began," "short time," or "at onset," and all cases in which labor had lasted six hours or less. Class C includes all cases late in labor from six hours to days, and cases stated to have had a "prolonged test."

There were 6 cases of cesarean hysterectomy, with no deaths. The indications for hysterectomy were as follows:

Case 1. Double mitral disease, flat pelvis. Three vaginal examinations.

Case 2. In labor 40 hours with a temperature of 103 before operation.

<sup>\*</sup>Includes 6 cases of cesarean hysterectomy.

- Case 3. In labor 48 hours, membranes ruptured 36 hours, repeated vaginal examinations by midwife and doctor.
- Case 4. In labor 17 hours, membranes ruptured 17 hours, two vaginal examinations.
- Case 5. In labor 72 hours, membranes ruptured 36 hours, repeated vaginal examinations and an attempt at forceps delivery.
- Case 6. In labor 40 hours, membranes ruptured 20 hours, six vaginal examinations.

Deduction of these cases would slightly reduce the maternal mortality for the contracted pelvis group.

The cause of death is stated in 51 of the 54 fatal cases:

Peritonitis	17
Septicemia	9
Hemorrhage	4
Pneumonia	4
Persistent vomiting	1
Shock	3
Embolism	5
Empyema	1
Pulmonary edema	2
Acute cardiac dilatation	2
Acute gastric dilatation	3

Fetal and Infant Mortality.—Among the 934 operations for contracted pelvis were 6 cases of twin pregnancies, and 4 cases in which the condition of the child was not mentioned, 936 babies in all. Of these, 900 left the hospital alive, 18 were stillborn, and 18 died later in hospital. The fetal mortality then is 1.9 per cent and the total mortality for the baby in this group is 3.8 per cent.

Further analysis of the stillbirths showed 5 cases not in labor, 10 in labor from twenty-six to seventy-two hours, while in the 3 cases the duration of labor was not recorded. One fetus had hydrocephalus.

Eighteen babies died during their hospital stay. Of six babies whose mothers were not in labor, one died of gastroenteritis on the fourteenth day, one of patent foramen ovale three weeks later, three died of pneumonia on the fourteenth and fifteenth days and one of pyloric stenosis. Three died in cases where forceps had been attempted. In three cases there was no statement as to the length of the labor, and in 6 cases labor had lasted from six hours to ninety-six hours.

The following operations were performed in these 934 cases:

Classical	723
Classical and myomectomy	4
Classical and sterilization	57
Classical, sterilization and salpingectomy	2
Lower segment operation, sterilization	1
Lower segment operation	138
Cesarean hysterectomy	6
Not stated	3

Among the classical operations, 3 are stated to have had the parietal peritoneum sutured to the uterine peritoneum about one inch away

from the uterine incision; another case is described as "high, classical, two flap." The lower segment operation is recorded as "low, two flap low, Krönig, Doederlein, Krönig-Doederlein, Beck," and other modifications of these terms.

The mortality and morbidity of these operative procedures have been studied in detail and will be found elsewhere in this report.

#### II. ECLAMPSIA AND OTHER TOXEMIAS

There were 210 cases as follows:

A. Eclampsia	104
B. Preeclamptic toxemia	46
C. Toxemia of pregnancy	41
D. Other toxemias	19

As to parity, 159 or 75.7 per cent were primigravidae, 36 had from one to five children, 3 had from six to nine children, and in 12 the parity was not stated. There were 34 maternal deaths in the whole group, a maternal mortality of 16 per cent.

Two hundred and nineteen babies are considered, including nine twin pregnancies. In all there were 48 deaths, a combined fetal and infant mortality of 21.9 per cent.

#### A. ECLAMPSIA

Maternal Mortality.—"Eclampsia" includes only those cases in which convulsions occurred. In 104 cases there were 27 maternal deaths, a mortality of 26 per cent. After deducting four cases of vaginal cesarean section, the corrected maternal mortality of abdominal cesarean sections for eclampsia becomes 27 deaths in 100 cases, or 27 per cent.

In 70 of the 104 cases the number of convulsions was stated. Twenty-one had less than six convulsions, the number of fits in the remaining 49 being stated as "many," "several" or varying in number from 6 to 25.

In 24 cases, convulsions persisted after operation, one patient having 17. In this group of severe cases, 14 died and 10 recovered.

Of the 104 cases, 74 were not in labor, 4 were in labor less than six hours, 10 more than six hours, and in 16 the duration of labor was not stated.

In 97 cases, classical cesarean section was done, in 3 cases low section and in 4 vaginal section.

The causes of death are listed in 13 cases as, lobar pneumonia, bronchopneumonia (2), cardiac failure, ileus, acute nephritis, toxemia, pulmonary edema, shock (2), sepsis, hemiplegia, and gastric dilatation.

Fetal and Infant Mortality.—There are 106 babies for consideration in this group, including two twin pregnancies. Twenty-five were stillborn, and 3 died later—a fetal and infant mortality of 26 per cent.

#### B. PREECLAMPTIC TOXEMIA

There were 46 cases in this group, where the diagnosis was stated as "preeclamptic toxemia, or threatened or impending eclampsia." Four patients died, two of peritonitis and one of uremic coma; none of these was in labor and three were primiparae. Mortality then was 8.7 per cent.

Among the 46 cases, 41 were not in labor, 4 were in labor over six hours, and in one case there was no note.

There were 40 classical operations and six low sections.

In fetal mortality 51 babies are to be considered, as there were five cases of twin pregnancies. Seven babies were stillborn and none died later, a fetal mortality of 13.7 per cent.

#### C. TOXEMIA OF PREGNANCY

In 41 cases the diagnosis was "toxemia of pregnancy." In 34 cases the patient was not in labor, in 3 a short time in labor, in 3 more than six hours, and in one this point was not stated.

Two patients died after operation. Neither was in labor. One, five and a half months pregnant, with bad urine, hypertension and optic neuritis, died on the twenty-fourth day of sepsis; the other at eight months with bad urine, hypertension and toxemia complicated by mitral stenosis, died of cerebral hemorrhage nine days after operation. Maternal mortality then was 4.9 per cent.

There were 43 babies, two cases of twins being included. Six were stillborn, and one died later, cause not stated. Fetal and infant mortality then was 16.3 per cent.

In 38 eases classical section was done, and in three low section.

#### D. OTHER TOXEMIAS

The 19 cases in this class included the following reported indications:

Nephritic toxemia	11	cases
Chronic nephritis	6	cases
Hepatic toxemia	2	cases

Fifteen cases were not in labor, 3 were in labor over six hours, and one only a few hours.

There was one maternal death—a case of nephritic toxemia which died of shock twenty-three hours after operation—a maternal mortality of 5.3 per cent.

Of the 19 babies, 4 died; one was stillborn, 2 died later of prematurity and in one the cause of death was not stated.

There were 15 classical operations and 4 low sections.

## III. ANTEPARTUM HEMORRHAGE

There were 117 cases of antepartum hemorrhage—98 cases of placenta previa and 19 cases of accidental hemorrhage. In the whole

group, there were 7 maternal deaths—a mortality of 6 per cent; and 30 fetal and infant deaths—a mortality of 25.6 per cent.

A. Placenta Previa.—The cases are subdivided as (1) complete or central; (2) incomplete, partial, marginal or lateral; and (3) "placenta previa," where variety was not specified. There were 7 maternal deaths in the whole group of 98 cases—a maternal mortality of 7 per cent. Subdivided mortality is as follows:

- 1. Complete and central, 47 cases, 2 deaths or 4.2 per cent.
- 2. Incomplete, etc., 13 cases, 3 deaths or 23 per cent.
- 3. "Placenta Previa," 38 cases, 2 deaths or 5.3 per cent.

Three cases died of hemorrhage or shock a few hours after operation; one died of embolism on the fifth day; one died on the second day of a septic thrombus of the adnexal veins; one case complicated by chronic endocarditis died on the fifth day of heart failure; and one died of gastric dilatation.

Classical section was performed 90 times and low section 8 times.

Fetal and Infant Mortality.—The number of children to be considered is 100, including two twin pregnancies. The number of fetuses born dead was 10—a fetal mortality of 10 per cent. The number of babies who died during their hospital stay was 8—an infant mortality of 9 per cent in the 90 surviving births. The causes of infant deaths were: prematurity, 7; melena neonatorum, 1.

B. Accidental Hemorrhage.—There were 19 cases, two of which were associated with toxemia of pregnancy. There were no maternal deaths and 12 dead babies; 11 were stillborn, and one died later of prematurity—a fetal and infant mortality of 12 or 63.2 per cent.

There were 17 classical sections in this group and 2 low sections. Seven eases were called abruptio or ablatio placentae and were apparently severe. The others were called accidental hemorrhage or separation of the placenta.

#### IV. OTHER CONDITIONS

The number of cases in this group is 544. Classification is difficult. The following plan has been followed:

- 1. Previous cesarean section.
- 2. Other operations.
- 3. Tumors.
- 4. Contraction-or retraction rings.
- 5. Cervical dystocia; rigidity of the cervix.
- 6. Congenital malformations.
- 7. Grave maternal diseases.
- 8. The fetus.
- 9. Rupture of the uterus.
- 10. Miscellaneous.

# These indications are detailed in the following table:

1. Previous cesarean section	130
2. Other operations, 57 cases.	
A. Abdominal	
a. Ventral fixation	6
b. Ventral suspension	7
c. For prolapse of the uterus	3
d. Myomeetomy	1
e. Hysterotomy	1
f. Ventral hernioplasty	1
g. Appendicectomy and oophorectomy	1 4
h. Unknown	4
B. Vaginal	
a. Amputation of the cervix	6
b. Operation on cervix	2
c. Vaginal plastic	12
d. Repair 3° lacerations	2
e. Vaginal hysterotomy	1
f. Interposition g. Interposition with amputation of the cervix	i
C. Combined a. Amputation of cervix and suspension	4
b. Repair of prolapse	1
c. Amputation of cervix and oophorectomy	1
d. Amputation of cervix and laparotomy	1
e. Unknown	1
3. Tumors, 63 cases.	
a. Fibromyoma of the uterus	- 51
b. Ovarian tumors	6
e. Carcinoma of the vagina d. Cyst of the vagina	1
e. Unclassified pelvic tumors	4
4. Contraction—or retraction rings	7
5. Cervical dystocia; rigidity of the cervix	47
6. Congenital malformations, 10 cases.	0
a. Uterus didelphys, vagina duplex	3
<ul><li>b. Uterus bicornis unicollis</li><li>c. Uterus unicornis</li></ul>	1
d. Uterus bipartis	1
e. Vagina duplex	1
f. Atresia of vagina	2
g. Malformation of vagina and cervix	1
7. Grave maternal diseases, 56 cases.	
a. Cardiac disease	42
b. Cardiac disease and nephritis.	2
c. Pulmonary tuberculosis and pyelitis	1
<ul> <li>d. Pulmonary tuberculosis and tuberculous hip</li> <li>e. Pyonephrosis</li> </ul>	1
f. Lobar pneumonia	1
g. Pyloric obstruction	1
h. Acute appendicitis	1
i. Manic depressive psychosis	1
j. Chorea gravidarum	1
k. Partial intestinal obstruction	1
1. Thyroid disturbance	1
m. Marked vaginal varicosities	

8. The fetus, 74 cases.	34
a. Disproportion	1
Disproportion and pendulous abdomen	
Disproportion and posterior head	4
b. Large baby	1
Large baby, face	9
d. Dead fetus	2 4 1 2 2 1 2
	1
e. Hydrocephalus f. Twins, no engagement	9
Twins, no engagement Twins, polyhydramnios	1
	1
g. Malpresentations and positions Breech	1
Transverse	6
Transverse and prolapsed arm	1
Posterior occiput	6
Posterior chin	1 6 1
Posterior shoulder	î
h. Previous stillbirths	8
9. Rupture of the uterus	11
•	11
10. Miscellaneous indications, 89 cases.	
a. Elderly or old primiparae	20
b. Uterine inertia	12
c. Failure to progress	12
d. Unsuccessful forceps	1
e. Obesity	1
f. Pendulous abdomen	1
g. Exostosis of pelvis	1
h. Pelvic inflammation	1
i. Exploratory laparotomy	1
j. Rectovaginal fistula	1
k. Pericervical parametritis	1
1. Vaginal obstruction	1
m. Prolapse of uterus	1
n. Patient's choice	1
o. Unknown or indefinite	34

# Group 1. Previous Cesarean Section.

In 130 cases a previous cesarean operation is given as the indication for another; in only 5 cases was there an added indication—eardiac (3), suspension of uterus (1), and toxemia (1). In 7 cases rupture of the old sear was thought to be imminent. Cases were divided as follows:

One previous section	106
Two previous sections	20
Three previous sections	3
Four previous sections	1

The operative procedures were classical 120, low 8, hysterectomy 1 and not stated 1. One case had myomectomy, and 16 were sterilized.

The maternal mortality was 1, a patient not in labor who died of peritonitis after the classical operation. In all there were 9 dead babies; 4 were stillborn, 3 died later and 2 were recorded as "dead."

In 85 cases labor had not begun; 19 were in labor less than six hours, and 14 were in labor from seven to twenty-four hours. In 12 cases there was no statement as to labor.

Group 2. Other Operations.

This group includes all operations, other than previous cesarean section, given as the indication for operation. In 48 cases previous operation perhaps had altered the axis of the birth canal, or narrowed it. In 8 the indication is not clear.

A. Abdominal Operations.—There are 24 cases in this group. There were 2 maternal deaths, a mortality of 8.3 per cent. Both died of sepsis after classical cesarean. One, after a uterine fixation operation, was three days in labor. The other was nine hours in labor, and had many adhesions as a result of an operation for a pregnancy in a rudimentary uterine horn. Eight were not in labor. In one, version had been tried. There were 3 lower segment, and 21 classic operations. One fetus was stillborn after a labor of thirty-six hours, a fetal mortality of 4 per cent in 25 babies (1 case of twins).

B. Vaginal Operations.—In this group of 25 cases there had been 10 operations on the cervix. All but two were cases of obstructed labor, one case stated as being in labor 115 hours. One patient with cervical dystocia due to a previous plastic operation, in labor 72 hours, died of peritonitis after classical cesarean; her obstetric history showed one stillbirth, followed by three spontaneous deliveries at term.

(d) One of the two cases sectioned to protect the repair of a complete laceration of the perineum, had a large baby; the other a history of previous stillbirths. Neither was in labor.

(e) One patient who had previously undergone vaginal hysterotomy for eclampsia, was sectioned at once when her membranes ruptured.

(f and g) The two cases of interposition were not in labor. They had classical cesarean and sterilization.

Maternal mortality in this group, 1 in 25 cases or 4 per cent. Two babies were stillborn, both after thirty-six hours of labor. One fetus died of prematurity twenty-four hours after birth. In this case labor had not begun, but cesarean was performed because of previous vaginal repair and the history of two difficult forceps deliveries. Combined fetal and infant mortality 3 in 25 babies—12 per cent. There were 24 classical sections, 1 low and 5 sterilizations in this group.

C. Combined Operations.—Among the 8 cases in this group, 5 had amputation of the cervix as well as an abdominal operation. In one case rupture of the uterus seemed imminent after a labor of six hours. Only one case was not in labor—a II para with high anterior and posterior wall repair and suspended uterus, and breech presentation. Six operations were classic, 2 low and one patient was sterilized. There was no mortality of mother or baby in this group.

Group 3. Tumors.

Fibromyoma of the Uterus.—Among the 51 cases, 3 mothers died, a maternal mortality of 6 per cent. In 5 cases hysterectomy was done with no deaths; in 13 cases, myomeetomy with no deaths (two by low

section). In the 33 others, classical section was performed in 27, the two flap low operation in 5, and vaginal section in one. In 24 cases the patient was not in labor, and there were 3 stillborn babies.

Details of the three maternal deaths are as follows: (1) Primipara, not in labor with intact membranes and no vaginal examination, died of general peritonitis. (2) Primipara, twelve hours in labor, eighteen hours after rupture of the membranes, and no vaginal examination, died of acute gastric dilatation and ileus on the fifth day after a two flap low section. (3) Primipara not in labor with membranes intact, and no vaginal examination, died of acute gastric dilatation and shock.

The 6 ovarian tumors were 5 ovarian cysts and 1 dermoid. There were no fetal deaths. One, with a cyst blocking the pelvis, six hours in labor with intact membranes and no vaginal examination, died of shock twenty-four hours postoperative. All operations were classical, with removal of the tumor (oophorectomy).

There were no fetal or maternal mortalities in the rest of this tumor group, and all the operations were classical without any other procedure.

In the entire tumor group of 63 cases the tumor was noted as obstructing labor in 15 cases. Total maternal mortality in 63 cases was 4, or 6 per cent. Total fetal mortality was 3, or 4.8 per cent.

Group 4. Contraction-or Retraction Rings.

Seven eases in this group, 5 primigravidae. (1) Contraction ring, two days in labor. (2) Contraction ring, brow, in labor thirty-six hours. (3) Contraction ring, posterior occiput, forceps tried, baby stillborn. (4) Contraction ring, posterior occiput, cervix undilated after seventy-six hours; baby was stillborn, and mother died of general peritonitis four days after classic section. (5) Contraction ring, disproportion, nonengagement after thirty hours. (6) Retraction ring, dry labor twenty hours, impending rupture of uterus. (7) Impending spontaneous rupture, dry labor twelve hours, died of septicemia on the seventh day after classical section. Maternal mortality, 2 in 7 cases, 28.6 per cent. Fetal mortality 2 in 7 cases, 28.6 per cent. The operations in the group were: classical 5, low 1 and hysterectomy 1.

Group 5. Cervical Dystocia.

This group includes 47 cases in which failure of the cervix to dilate could not be ascribed to malformation or previous operation. In 38 cases the indication was stated simply as "cervical dystocia"; slow or faulty first stage, atresia of the cervix, and rigid or undilatable cervix were the other terms used. One case was a breech. All were in labor.

In 45 cases in which the duration of labor was stated, the time ranged from six to ninety hours, with an average duration of thirtythree hours.

There were 21 lower segment operations and 26 classical with two maternal deaths, a mortality of 4.5 per cent. One, 72 hours in labor

with membranes ruptured 114 hours, no vaginal examination, died of peritonitis and pulmonary edema on the third day after a two flap low section; the other, in labor 46 hours, with membranes intact and one vaginal examination, died of pelvic abscess and pneumonia two weeks after classical cesarean.

One baby died of intracranial hemorrhage three days after birth. Labor had lasted for 24 hours with membranes ruptured for 36 hours. Infant mortality in 48 babies (1 case of twins), 2 per cent.

Group 6. Congenital Malformations of the Uterus and Vagina.

These interesting anomalies have been sufficiently detailed. Of 10 cases, 5 were not in labor. Two had been sectioned before for uterus bipartis and congenital atresia of the vagina respectively. There were 9 classical sections and 1 Krönig. No maternal mortality. One baby died on the sixth day, an infant mortality of 10 per cent.

Group 7. Grave Maternal Diseases. 56 cases.

(a) Cardiac disease. There were 42 cases with a maternal mortality of 2 cases, or 4.8 per cent. The varieties of cardiac disease were these: (1) Mitral disease: 9 stenosis, 2 regurgitation, 10 double, and 1 "mitral disease." (2) Aortic and mitral disease 1. (3) Myocarditis 1. (4) "Cardiac disease" 18. In 9 cases, the heart was decompensated at the time of operation, 3 of these mitral disease; one case had decompensated several times during pregnancy. In 36 cases the patient was not in labor, in 5 labor had lasted from two to twenty-eight hours, and in 1 this fact was not stated. The types of operation in these 42 cases were classical 39, low 2, classical with hysterectomy 1. There were 13 patients sterilized in this group.

Details of the two fatal cases follow: chronic cardiac disease, not in labor, classical section, died of cardiac failure nine days after operation. The other case decompensated mitral stenosis with a cervical fibroid, short time in labor, died of cardiac failure eleven days after operation.

Twins, in a case of decompensated mitral stenosis, at seven and one months were stillborn. Fetal mortality among 43 babies of the cardiac group, 4.7 per cent.

(b-n) Other grave maternal diseases.

In this group of 14 cases there were 4 maternal deaths as follows: (1) Chronic nephritis with chronic myocarditis and fibrillation, at the seventh month, not in labor, died in coma four days after operation. (2) Lobar pneumonia two hours in labor, died of lobar pneumonia on the seventh day. (3) Pyloric obstruction, high value baby, not in labor, died five days after operation, of acidosis, ileus and shock. In these 14 cases there were 2 fetal deaths, both premature at seven months (chronic nephritis and acute appendicitis). (4) Pelvic abseess, five hours in labor, cesarean hysterectomy with bilateral salpingo-oophorectomy, died of peritonitis twenty-four hours later. To-

tal maternal mortality in the whole group of 56 cases, 6 or 10.7 per cent. Total fetal mortality in the 57 babies (2 cases of twins), 4 or 7 per cent.

Group 8. The Fetus.

A. In 37 cases of disproportion the weight of the baby is recorded only four times, as 8 to 12 pounds. Four were not in labor. In 33 cases the duration of labor was recorded as from one to sixty-four hours with an average duration of twenty-three hours. Two mothers died. Three babies died, one stillborn and two died later, one of cardiac anomaly. Thirty-two cases were classical section, 5 low.

Details of fatal cases follow: (1) In labor twenty-four hours, no engagement, baby 10 lbs. 4 oz., classical section, died of peritonitis four days after operation. (2) In labor six hours, baby weighed 12 lbs., classic section after attempted version; the baby was stillborn. Maternal mortality in 37 cases, 2 or 5.4 per cent. Combined fetal and infant mortality, 3 or 8.1 per cent.

B. Large baby, 5 cases. There was no maternal mortality, and 1 baby died two weeks later. Three operations were classical and 2 low In the face case the baby was in distress but was born alive.

C. Fetal distress. Two cases of impending fetal asphyxia. One case six hours in labor with membranes ruptured, had a classical section; both mother and child lived. The other patient with membranes ruptured thirty-six hours, and cervix dilated 2 cm. after twenty-four hours of labor had a two flap low section. The mother lived, but the baby died on the third day of intracranial hemorrhage.

D. Dead fetus: (1) at term, not in labor, mother developed a psychosis on the sixth day, after classical section. (2) Eight months fetus, dead six weeks, primigravida, not in labor, hysterectomy for gangrenous uterus, tubes, and ovaries; uterine vessels thrombosed—left ovarian only vessel ligated, uneventful recovery.

E. Hydrocephalus. Eighteen hours in labor, membranes ruptured twelve hours, classical section, both mother and child lived.

F. Twins, 3 cases. All classical sections. (1) Primipara, not in labor, no engagement, died of peritonitis, the twins were stillborn. (2) Primipara, polyhydramnios, five and one-half months pregnant, not in labor, mother lived but twins were stillborn. (3) VII para, fetal dystocia, twenty-four hours in labor; both mother and child lived.

G. Malpresentations and positions, 16 cases. Fourteen operations were classical and 2 low. All were in labor. There were 4 maternal deaths. Two babies died, one stillborn and the other after five days. Details of the fatal cases follow: (1) Primigravida, right occipito-posterior position, after a test of labor, and low section, died of embolism. (2) VI para right scapula posterior position, in labor, with membranes ruptured forty-eight hours, classical section, died of embolism fifteen days postoperative. (3) Primigravida, mentoposterior

position, 108 hours in labor, with membranes ruptured 105 hours, died of shock 2 days after operation (4) II para, left posterior occiput unengaged, cervix poorly dilated, nineteen hours in labor, membranes ruptured eight hours, died of septicemia five days after classical section. Maternal mortality of this group 25 per cent.

H. Previous stillbirths. In this group of 8 cases there was no maternal or fetal mortality. None was in labor. Four cesareans were classic, 2 two flap low. One had 4 previous stillbirths, one had 3, four had 2, and two had one.

Group 9. Rupture of the Uterus.

In this group of 11 cases there were 3 maternal deaths and 9 fetal deaths. The causes of rupture were as follows: 3 cases had one previous cesarean section; 1 case had two cesarean sections; 1 case had 3; 3 followed forceps; 2 followed version; and in 1 the cause was unknown. Hysterectomy was done in 4 cases, and the wound resutured in 7.

Details of the fatal cases follow: (1) Primigravida, seventy-two hours in labor, attempted version, died of hemorrhage three hours after operation. (2) IV para, twenty-eight hours in labor, uterus ruptured in lower segment, cause unknown, died of shock two days after operation. (3) III para, twenty-four hours in labor, forceps applied twice, uterus ruptured in lower segment, died during hysterectomy.

Maternal mortality in 11 cases, 3 or 27.3 per cent. Fetal mortality, 9 or 81.8 per cent.

Group 10. Miscellaneous Indications. •

(a) Elderly or old primipara. In this group of 20 cases in which "elderly primipara" or "old primipara" was the first indication for operation there were added indications in 15 cases, as follows: vertex not engaged (3), disproportion (1), breech (1), large baby, breech (1), dry labor (1), large baby, dry labor (1) and rigid cervix (7). There were 3 patients not in labor, and the others were in labor from three to seventy-two hours, with an average duration of nineteen hours. The age in 8 cases was thirty to thirty-five years, in 7 cases thirty-five to forty years, and in 5 cases forty to forty-five years. Classical operations were 13, and low 7.

In this group of 20 cases, 3 patients died, a maternal mortality of 15 per cent. One baby, monstrosity, died shortly after operation.

Details of fatal cases follow: (1) Age, thirty-three, dry labor, cervical dystocia, fetal distress, maternal exhaustion, in labor thirty hours, membranes ruptured for thirty-four hours, 4 vaginal examinations, low section, died of peritonitis and lobar pneumonia six days after operation. (2) Age forty-one, in labor four hours, membranes ruptured for seven hours, head unengaged, classical cesarean, died of spreading suppurative peritonitis. (3) Age forty-one, three days in labor, with membranes ruptured for three days, no vaginal examina-

tion, vertex unengaged, cervix poorly dilated, classical cesarean, spinal anesthesia, died of lobar pneumonia ten days after operation.

- (b) Uterine inertia, 12 cases. There was no maternal or fetal mortality, in 11 cases of classical cesarean, and 1 cesarean hysterectomy in a patient ten hours in labor after induction with a bag. Thirteen babies were in this group (1 case of twins).
- (c) Failure to progress. In 12 cases the indication was stated as "failure to progress" after a certain period of time, which varied from ten to seventy-two hours. All but one were primigravidae. One mother died, and one baby died three hours after delivery. Detail of fatal case: Failure to progress after eighteen hours of labor, with membranes ruptured twelve hours, and many vaginal examinations, died of peritonitis thirteen days after classical cesarean.
- (d-m) No fetal deaths in this group and 1 maternal death, obesity 240 lbs., not in labor, died of cardiac failure twenty-four hours after classical cesarean.
- (n) This patient had had two babies, the first stillborn, the other instrumental.
- (o) In this group of 31 cases indications were either unknown or not definite. There were 2 stillborn babies. Many details are missing from this group. There was 1 maternal death, peritonitis after low section in a patient thirty-two hours in labor.

#### OPERATIONS

Cesarean Hysterectomy.—In the entire series of 1805 cases of cesarean section there were 21 cases of cesarean hysterectomy, distributed as follows: Class I, 6 cases with no deaths; Classes II and III, no cases; Class IV, 15 cases with 3 deaths. The indications for the six cases in Class I are detailed under Contracted Pelvis.

In the remaining 15 cases, hysterectomy was done for previous Cesarean (1), Fibromyomata (5), Contraction ring (1), Endocarditis (1), Pelvic abscess (1), Uterine inertia (1), Ruptured uterus (4), and dead fetus, gangrenous uterus (1).

Death occurred in the case of pelvic abscess, and in two cases of rupture of the uterus. Details of these cases may be found under those headings. Maternal mortality in 21 cases, 3 or 14 per cent. Deducting 4 cases of rupture of the uterus and 2 deaths, the true maternal mortality for cesarean hysterectomy is 6 per cent.

Classical Cesarean and the Lower Segment Operation.—Further conparison of operative procedures has been made upon the basis of the duration of labor and record of vaginal examinations done during that time.

For this analysis, the following large groups of cases were rejected as in them there were factors outside the operation itself which might well influence the result: Eclampsia and other toxemias, Antepartum Hemorrhage, Tumors, Grave Maternal Diseases, Rupture of the Uterus, and Unknown or Indefinite. 1202 cases were available for study.

#### DEATHS AND COMPLICATIONS

In "Remarks on Puerperium" in the records submitted, the words "uneventful, normal, febrile, afebrile, no morbidity, wound infection and wound burst" appear. In many cases postoperative temperature was detailed. It was not possible, however, to draw any accurate conclusions from these statements. Only definite clinical complications were considered. Deaths have been allocated to their proper group.

TABLE II

		A. CLAS	A. CLASSICAL		OWER MENT
		CASES	DEATHS	CASES	DEATHS
1. Not in labor.	(a. No vaginal examination	390	13	58	_
Membranes intact	b. Vaginal examination	10	-	-	-
2. Early in labor.	\a. No vaginal examination	125	3	. 2	_
Up to 6 hours	a. No vaginal examination b. Vaginal examination	18	1	4	1
3. Late in labor	a. No vaginal examination b. Vaginal examination	273	16	66	1
5. Lave in labor	b. Vaginal examination	199	27	57	6
		1015	60	187	8

Group A. Classical. Table II.

1 a. Thirteen deaths: Embolism two cases, shock two cases, acute gastric dilatation two cases, peritonitis two cases, pneumonia three cases, thrombophlebitis and psychosis. Complications: Pyelitis two cases, phlebitis two cases, bronchitis two cases, thrombophlebitis, pneumonia, and peritonitis.

1 b. No deaths or complications.

2 a. Three deaths: Peritonitis, pneumonia, and acute gastric dilatation. No complications.

2 b. One death: Peritonitis. No complications.

Group B. Low. Table II.

1 a. No deaths. Complications: Pyelitis (2), embolism, thrombophlebitis.

1 b. No deaths or complications.

2 a. No deaths or complications.

2 b. One death: Cardiac failure two hours after operation. No complications.

The "Late in Labor" group includes so many cases in labor over a long period of time, that it seemed wise to subdivide it on a progressive six hour basis, Table III.

Table III. Deaths and Complications, Late in Labor.—In the following detailed statement of deaths and complications in the Late in Labor group, the numerals indicate the number of hours the patient was in labor.

TABLE III. LATE IN LABOR

A. CLASSICAL				B. LOWER SEGMENT				
HOURS NO VAGINAL EXAM. IN LABOR CASES DEATHS					NAL EXAM. DEATHS	VAGINAL CASES DEATHS		
6-12	89	5	48	4	13	_	7	-
12-18	50	2	29	4	11		3	-
18-24	50	2	45	5	11	-	11	-
24-30	34	2	11	-	4	-	6	2
30-36	18	1	20	2	7	_	6	1
36-42	. 8	_	6	1	2	_	4	1
42-48	14	1	13	-	8	-	8	1
Over 2 da	ays 10	3	27	11	10	1	12	1
	_			_		-	-	_
	273	16	199	27	66	1	57	6

#### CLASSICAL OPERATION

No Vaginal Examination. 273 cases.

Sixteen deaths: Peritonitis 8 (two cases), septicemia 12, embolism 12, pneumonia 12, shock 15, cardiac failure 17, peritonitis 24, cardiac failure 24, peritonitis 25, septicemia 26, pneumonia 36, peritonitis 38, shock 48, peritonitis 72, pneumonia 72. (Numerals indicate hours in labor.)

Complications: Pulmonary infarct 8, pyelitis 7, pneumonia 12, thrombophlebitis 28 (two cases), hemorrhage 38, thrombophlebitis 46. Vaginal Examination. 199 cases.

Twenty-seven deaths: Embolism 10, septicemia 12, peritonitis 12, peritonitis 14, peritonitis hemorrhage 15, peritonitis 18, septicemia 18, peritonitis 20, embolism 24, pneumonia 24, peritonitis 24 (three cases), peritonitis 32, cardiac failure 34, peritonitis 41, cardiac failure 50, pneumonia 56, infection 60, sepsis 60, pulmonary edema 72, shock 72, pneumonia 72, peritonitis 76, sepsis 72, peritonitis 96, shock 108.

Complications were, pyelitis 8, sepsis 30, and phlebitis 68.

#### LOWER SEGMENT OPERATION

No Vaginal Examination. 66 cases.

One death, due to peritonitis and pneumonia after seventy-two hours of labor.

Complications: Pyelitis 33.

Vaginal Examination. 57 cases.

Six deaths: Cardiac failure 25, peritonitis 30, cardiac failure 36, peritonitis 40, hemorrhage 48, septicemia 96.

Complications: Thrombosis of femoral vein 22, and pelvic absecs 72.

In this analysis of 1805 cases of cesarean section, 374 of which, or 20.7 per cent, had been sectioned before, no attempt has been made to draw any conclusion from the material presented in the report. The figures speak for themselves, and are now available for such study.

It should be stated that, although great effort was made to secure reports from all the hospitals in our Borough, not all the operations of cesarean section performed in Brooklyn from 1921 to 1926 are included. We believe, however, that comparatively few escaped our search. All the large hospitals, public and semiprivate, and most of the smaller private institutions responded.

I wish to express my appreciation of the service of Dr. David Kuperstein who assisted me very materially in the compilation of these figures.

256 JEFFERSON AVENUE.

#### THE LONG LABOR\*

### By Harold Bailey, M.D., New York

ARTICLES often appear in the literature decrying radical obstetrics. There is a general belief that the modern obstetrician is in too great a hurry and forces an operative delivery rather than awaiting the efforts of nature. However, the pendulum may swing too far toward conservatism and the labor be so prolonged that the mother's life is endangered. Anyone who has charge of an emergency or outdoor service is certain to see many cases of prolonged labor, occasionally even cases that have days rather than hours of labor.

In the course of the past six years on the Cornell teaching service at Bellevue Hospital and the Berwind Maternity Clinic there have been some 15,000 deliveries and of the deaths that occurred, five, or one in 3,000, were attributed provisionally to anesthesia. It is true that in each of the five cases there was a subsidiary diagnosis and in two cases autopsy revealed gross disturbances, nevertheless as the deaths occurred quite unexpectedly at the end of labor, it seemed that they were really due to the trials and stress of the labor itself. As these cases appeared from time to time during this period, it became evident that they had one factor in common and that was the protracted length of the labor. In an attempt to prevent future deaths of this nature we have made a study of the long labor.

There are certain conditions always present in labor that predispose toward shock at the time of delivery. In the first place, as Williamson¹ has demonstrated, an acidosis exists in normal labor. Secondly, toxemia before and during labor is accompanied by acidosis. Third, there is acidosis produced by the anesthesia itself. Fourth, there is a lowering of the  $\mathrm{CO}_2$  combining power that is coincident with the lowering of the blood pressure. If these factors are existent in labor of the ordinary length, how much deeper will be the acidosis produced in labor which is protracted over days. The exhaustion then becomes

<sup>\*</sup>Read at a meeting of the Brooklyn Gynecological Society, March 2, 1928.

complete; there is an accumulation of acid bodies in the system due to muscle exertion; there is an overventilation of the lungs² due to the expulsive efforts and cries of the patient; and there is the beginning acidosis from starvation since very few of these patients can retain much of their caloric intake.

This subject will be discussed under the following headings:

- 1. The tendency toward death in normal labor of ordinary length.
- 2. Secondary inertia, usually with malposition of the head, as occiput posterior or brow.
  - 3. Dry labor.
  - 4. Induced labor.
  - 5. Trial labor in relatively contracted pelves.
  - 6. Primary inertia including the so-called rigid cervix.
- I. The Tendency Toward Death in Normal Labor of Ordinary Length.—We offer two examples to illustrate this point. One, the death of a woman who had a preexisting toxemia; the second, a normal patient who recovered from shock that occurred after a not unduly prolonged labor.

Case 1.—E. G., Berwind Maternity Clinic, June, 1924, colored para iv, aged thirty. This patient had a nephritic toxemia with a blood pressure of 260/160, edema and eye symptoms. She had a venesection and after a dose of castor oil, promptly went into labor and delivered spontaneously a living child, in five and one-half hours.

Not long after the return of the doctors from the case, a call was sent saying the patient was weak and sweating. Immediate response found her in moderate shock. She was given ergot and caffein by hypodermic injection. She improved and the doctors returned to the clinic. In half an hour they were again called and found her unconscious. Death resulted in fifteen minutes. There had been no excessive bleeding.

Comment.—It was felt that death was due to shock in a patient who had many of the predisposing tendencies mentioned above. This tendency to shock in eclampsia and chronic nephritis was fully discussed in my paper of 1911<sup>3</sup> and in Schwarz's article in 1923.4

Case 2.—C. I., Berwind Maternity Clinic, April 4, 1927, aged twenty-three, para iii. Normal pelvis, negative medical and obstetric history. This patient had a twenty-hour labor with spontaneous delivery of a living full-term child. The placenta was expelled spontaneously and there was no excessive bleeding.

Two hours after delivery the nurse reported the patient in shock with an imperceptible pulse, rapid respirations and complaints of thirst. There was no external hemorrhage. On the arrival of the staff doctor, the blood pressure was 70/28, and the patient was in a typical condition of shock. She was given ¼ gr. morphine, coffee by rectum, etc., and placed in the Trendelenberg position. Her condition gradually improved and at the end of six hours, the blood pressure was 110/70, and the pulse 110 and from that time on recovery was uneventful.

II. Secondary Inertia, Usually with Malposition of the Head as Occiput Posterior or Brow.—Delay in occiput posterior cases is so common that we all have encountered many instances. Over here in Brooklyn

the position of occiput posterior is considered so abnormal that many seek to turn the head to the anterior position at the inlet of the pelvis. I have never deemed this wise nor, I might say, justifiable.

Bony obstruction in the pelvis or manipulation by the attendant is very apt to lead to deflection which causes the long occipito-frontal diameter of the head to pass through the pelvis. Under such circumstances the head usually passes into midpelvis and lies there with both the fontanelles palpable to the examining finger and the pelvic floor is not reached until the head has undergone extreme molding. It then assumes a ball-like semblance and finally reaches the pelvic floor. This takes a long time and not infrequently the woman passes into exhaustion and secondary inertia before this happens. If the head does not advance but lies in midpelvis, there is no pressure upon the cervix which then does not dilate more than 3½ fingers. Frequently the membranes do not rupture but are stretched tightly over the long diameter that is presenting, so that there is no forewater to aid in dilatation. If full dilatation is awaited before proceeding to the delivery of these patients, another twenty-four hours may pass so that the labor will be forty or more hours in length.

There are two forms of treatment. The older method and the one used by nearly all general practitioners and those doing but a moderate amount of obstetrics, is to give the patient either morphine or chloral to permit her to rest. After three or four hours' sleep, labor again begins with active pains, the so-called secondary inertia vanishes and eventually the head reaches the pelvic floor, rotates to the front and delivery takes place. The disadvantage of this treatment, aside from the long labor, lies in the possibility of damage to the child from prolonged head pressure.

With the second method the patient is placed under deep ether anesthesia, the cervix manually dilated as widely as possible and the child delivered by forceps. I believe that the best form of forceps delivery, providing the cervix has passed over the head, is to rotate the head to the transverse and to apply the forceps so that there is but one application. This is an old method that has recently been popularized by H. C. Williamson<sup>5</sup> If the head is in midpelvis and molded to a ball-like shape, the Bill method is exceedingly easy, as the forceps conducts the round molded head in a circle in midpelvis, the cavity of the latter being also nearly round. The Scanzoni is another forceps procedure that, in my experience, has proved efficient. There is danger in these operative measures as the point of the forceps is very apt to tear the rim of the cervix which can never be manually dilated to the normal full dilatation. The hemorrhage that occurs following a tear must be controlled by repair. In proper hands, the advantages of this more radical method are numerous: pari passu with the shortening of the labor, are decreased exhaustion, and absence of shock with the accompanying danger from anesthesia. Pressure damage to the soft parts is diminished and there is less susceptibility to sepsis.

Case 3.—S. S., Bellevue Hospital, July 2, 1927, aged twenty-nine, para i. Not a clinic case. Forty weeks pregnant. Pains started on June 28. On June 29 the amnion broke and the pains ceased. The contractions began again on July 1. After an unsuccessful attempt at forceps by a private physician, the patient was sent to the hospital.

On admission, July second at 1:50 P.M., the patient was anemic and moderately cyanotic, having continuous rigors, no uterine contractions, blood pressure 50/20, no fetal heart heard, temperature 100°, pulse 120, respiration 28.

At 3:30 p.m. gum glucose was injected intravenously. The systolic blood pressure rose to 95. Examination: R.O.P. Dead baby. At 5:15 p.m., craniotomy. Second degree laceration. Blood pressure after delivery 70/40. Condition fair. Magendie gr. ¼.

July 3, temperature normal. Blood pressure 102/72. On the fourth day the patient had a chill and the temperature rose to 105°. Twenty days later she died of a pelvic abscess which had been opened in the gluteal region.

III. Dry Labor.—An analysis of 477 cases of dry labor on the Bellevue service, 1922 to 1926, made by Dr. Theodore Holzager, at the time a fourth year student at Cornell, shows that rupture of membranes in 86 per cent occurred before the onset or at the onset of labor. The duration of labor was not increased, the average, in 220 cases, for primiparas being thirteen hours and forty minutes and for multiparas, ten hours and ten minutes. In 77 cases, or 16.1 per cent, operative intervention was necessary. There were 12 cesareans, 10 high forceps, 16 midforceps, and 1 eraniotomy. It should be understood that these cases occurred during the years in which I was carrying out trial labor, and this accounts for the cesarean sections. Dry labor was the only indication for operative interference in but 7 cases of the 77, or, as Dr. Holzager concludes, "We may assume that it played some part in leading to other factors." There was only one death in the group, a woman with a chronic cardiac condition who died of pneumonia four days postpartum. Sixteen per cent of the 477 cases were occiput posterior positions. We may conclude, therefore, that only in exceptional cases, that is, those in which dry labor accompanies malposition, malpresentation or contracted pelves, does it enter into this discussion and then merely as a side issue.

IV. Induced Labor.—We no longer induce labor in patients with contracted pelves and, aside from the bleeding cases, employ this procedure only in medical complications that threaten the life of the mother, especially preeclampsia and chronic nephritis. Induction in toxemia is apt to lead to a prolonged labor because the uterus does not respond readily to irritation. There are several points which should be understood concerning bag inductions: in the first place, we never use a bag smaller than a No. 4; in the second, as soon as the bag comes out the patient is douched with a lysol solution and the mem-

branes ruptured. Labor will frequently subside if the membranes are not artificially ruptured at this time.

Case 4.—M. R., Bellevue Hospital, May 21, 1925, aged forty, para i, thirty-eight weeks pregnant. Patient was sent in from the prenatal clinic as a pre-eclamptic with blood pressure 160/110 and albumin 4-plus. After four days in bed with medical treatment, there was no improvement.

On May 25, at 11 a.m., a No. 4 Voorhees bag was inserted. It was expelled on May 26 at 1:30 p.m. The membranes were ruptured artificially. Three minims of pituitrin were injected for 3 doses. Labor continued but with little force to the pains. Fifty-four hours after the insertion of the bag, the patient was prepared for forceps delivery. Position R.O.P. Ether was used by the drop method on an open cone. Ten minutes after the start of the anesthesia the patient ceased to breathe. Artificial respiration was unsuccessful and the patient died. High forceps were applied to the infant who was delivered alive and was later discharged on the tenth day. Only a moderate amount of ether was used.

The autopsy showed vegetations on the mitral valve and myocardial changes which were unknown to us from the clinical findings. There was also chronic nephritis.

Comment.—Twenty-four hours after labor started, the CO<sub>2</sub> was 44 per cent. We believe that at the end of fifty-four hours, at the time the anesthesia was started, the CO<sub>2</sub> was probably greatly reduced, but we had no chemical determinations at that time, and we have no blood pressure readings to check the condition. This case was provisionally considered as an anesthetic death.

V. Trial Labor in Relatively Contracted Pelves.—We believe that a trial labor is the correct method of conducting delivery in relatively contracted pelves. Our end-results in 676 cases of contracted pelves so treated during these six years, was 3 maternal deaths.<sup>6</sup> One death was from anesthesia, and I first reported it as probably due to apnea, but I now believe that it was more probably due to acidosis.

CASE 5.—G. P., Berwind Maternity Clinic, December, 1923, aged twenty, para i. Pelvis generally contracted. Labor at term. After forty hours of active labor the patient was transferred to the hospital.

The cervix was 3 fingers dilated, the head overflexed and engaged. The patient was prepared for cesarean section. The anesthesia was started with chloroform and changed to ether. The abdomen was opened and immediately respirations ceased though the pulse remained at the wrist for several minutes. Artificial respiration was of no avail and the patient died. The uterus was immediately emptied, the fetal heart continued to beat for a few moments but attempts to establish respiration failed.

The autopsy on the mother was entirely negative as to the cause of death.

This case suggested to us that chloroform anesthesia was not responsible for the death, at least directly, for chloroform deaths are cardiac deaths rather than respiratory deaths and in this case it was clearly evident that the woman's heart continued to beat after the cessation of respirations. Yandell Henderson in 1909 suggested that fatal apnea might be due to the sudden relief of pain as by an anesthetic. With pain there is a loss of what he terms the protective CO<sub>2</sub> by excessive pulmonary ventilation. As the CO<sub>2</sub> stimulates the re-

spiratory center, sudden relief of pain may terminate the stimulating factors which protect the individual and death from respiratory failure results. A. C. Williamson suggested that sudden anesthetic deaths may be really acidotic, preventable if due regard is given the lowered CO<sub>2</sub> tension. We feel and have repeatedly stated that tests of labor should not last for more than twelve hours of hard pains; if engagement has not then occurred, a cesarean section of the Beck type should be done without further delay and without awaiting full dilatation which has heretofore been the standard for a test of labor.

Case 6.—H. R., Bellevue Hospital, April 28, 1927, aged twenty-one, para i. Not a clinic case. Forty weeks pregnant. Generally contracted pelvis. Labor started April 27, at 6 a.m. The patient was admitted after twenty-eight hours of labor at home under the care of a colored physician who made many vaginal examinations through an unshaved vulva and without gloves.

Vaginal examination in the hospital showed the head floating high; R.O.P.; the cervix  $4\frac{1}{2}$  fingers dilated and thin. The  $\mathrm{CO}_2$  at this time was 41 per cent and the blood pressure 134/76. Because of the exhaustion of the patient a prophylactic injection of 325 c.c. of gum glucose was started at the same time as the anesthesia. The  $\mathrm{CO}_2$  was taken and later reported as 29 per cent. The blood pressure was 150/70.

A forceps attempt at delivery was unsuccessful and was followed by prolapse of the cord which was nonpulsating. Craniotomy was then performed. The fetus weighed 3050 grams. Two hours after the delivery the CO<sub>2</sub> was 44 per cent and the blood pressure 136/70. The patient was discharged on the tenth day in good condition.

VI. Primary Inertia Including the So-called Rigid Cervix.—There were several cases in this group, some of them being classed as primary inertia and some as rigid cervix. There were two deaths, one apparently an anesthetic death and one obviously due to shock.

The first case illustrates primary inertia in contracted pelvis with preeclamptic toxemia.

Case 7.—B. D., Berwind Maternity Clinic, November 10, 1927, para iv. The patient went spontaneously into labor but the pains failed to produce dilatation of the cervix. After three days of labor, she was transferred to a hospital not under our control where a cesarean section was done at once. The patient went into progressive shock and died two days later. The autopsy was negative and the clinical diagnosis of shock was accepted.

The second case illustrates primary inertia.

Case 8.—E. R., Berwind Maternity Clinic, colored, January 28, 1926, para i, aged thirty-seven. The patient was seen on January 28 and the case "false called." The following day the pains were occurring every six minutes, the cervix was two fingers dilated, but as the pains were weak the doctor returned to the clinic and reported the case again as false called. Later that night the patient was seen again and labor was not progressing.

After thirty-nine hours of labor, the head was R.O.A. and engaged; the cervix four fingers dilated and the fetal heart 130. Six hours later (forty-five hours after labor had started) the cervix was fully dilated with the patient showing signs

of exhaustion; the pulse was 130 and fair in character. Forceps were applied by one of the visiting staff. The child was large and stillborn. The anesthesia was discontinued just prior to the completion of the forceps operation and the repair of the episiotomy. There was no abnormal bleeding. Immediately after the expulsion of the placenta the patient stopped breathing and failed to respond to all efforts at resuscitation.

Comment.—I have felt that this case was one of acidotic shock following the stress and exhaustion of a long labor.

Case 9.—M. P., Berwind Maternity Clinic, January 2, 1928, aged thirty-two, para i. Past history negative. After twenty-nine hours of labor, with full dilatation and head low in the pelvis, ether anesthesia was given and as low forceps were being app'ied, respiration failed. The patient died despite attempts at resuscitation. The fetus was not extracted.

The provisional diagnosis was anesthetic death. No autopsy was obtained.

Case 10.—M. K., Bellevue Hospital, July 3, 1926, aged twenty-seven, para i. Not a clinic case. Forty weeks pregnant. Normal pelvis.

The patient was admitted in shock on July 3 at 1:45 p.M. with temperature 104° and blood pressure 70/40. She was said to have been in labor for fifteen days and to have had fifteen vaginal examinations. The membranes ruptured six days before. The uterus was tonic; the cervix two and one-half fingers dilated and very rigid; the head high and fitting tightly in place; contractions every two to three minutes and uterus tonic between. Thick, yellow pus came from the uterus on examination.

Morphine gr.  $\frac{1}{4}$  given and at 4:05 p.m. an infusion of 250 c.c. gum glucose was started. At 4:35 p.m. the blood pressure was 94/10. At 4:50 p.m. blood pressure was 102/60 and eraniotomy was then performed. One hour after the operation the blood pressure was 86/30 and the pulse 140. One thousand e.c. saline was injected an hour later.

During the puerperium the temperature varied from 98° to 104°. The urine showed pure culture B. coli. Five c.c. of boiled milk by subcutaneous injection at five different times. The patient's general condition improved very much but she left A.O.R. on the seventeenth day—the first day the temperature had been normal.

The proper treatment of cases of primary inertia is still unsolved. While morphine allows the patient to rest, it usually merely delays the progress as the patient is apt to go out of labor for twelve hours. Packing to secure dilatation is futile. At the time the patient appears for consideration it is too late to do a cesarean section, because the uterus and the amniotic sac are likely to be infected. It has been suggested by Polak that these cases be treated by packing the vagina tightly with wet cotton. In a recent case I varied this treatment by inserting a No. 4 bag and packing the vagina fully with wet gauze. In this case full dilatation occurred twenty-five hours after the insertion of the bag. The cervix was so effaced that, as the brow was presenting, version was done without injury to the mother and a living child delivered. The entire labor lasted sixty hours. While the endresults were entirely satisfactory for both mother and baby, we do not approve of a version after a long labor because of the danger of rupturing the lower uterine segment. High forceps would be a better procedure and in the event of failure one could resort to craniotomy.

#### SUMMARY

A. C. Williamson has suggested that acidotic shock is the cause of sudden death from anesthesia at the end of labor. This would seem to be a logical explanation of the five anesthetic deaths that have occurred in our 15,000 deliveries during the past six years. We have shown that each of these cases had prolonged labor. When labor is prolonged, the acidosis increases hour by hour and with the lowering of the CO<sub>2</sub> there is a coincident lowering of the blood pressure. Since we have been working on this theory, we feel that all patients who show signs of acidosis should be treated for this condition before operation is attempted.

There are two or three clinical signs that are of aid in diagnosing acidosis. The patients have bright red lips, the body surface is dry, and the blood pressure low and exhaustion marked.

In the one case in which we carried on the  $\mathrm{CO}_2$  readings and blood pressure observations, the blood pressure did not drop in relation to the  $\mathrm{CO}_2$  percentage as cited by Cannon in his traumatic shock cases. These  $\mathrm{CO}_2$  readings, however, were not obtained immediately but held over until morning and perhaps, therefore, cannot be considered as accurate. Some obstetrician who has the facilities at hand should conduct a research controlling the  $\mathrm{CO}_2$  and the blood pressure readings at six-hour intervals in labors that are from thirty to sixty hours in length. This would give us definite information as to whether the blood pressure readings might be accepted as an indication of the actual stage of acidotic shock.

Morphine is one of the first requirements for relieving the condition of acidosis. The rest afforded by 1/4 gr., in itself, tends to raise the CO<sub>2</sub> combining power and relieves the nervous tension of the patient. Morphine should not be used in long labors for the purpose of allowing the patient to rest and then return to a stronger labor but to prepare her for operative delivery. If the labor is over twelve hours, the patient should have regular feedings of high caloric and easily assimilable food such as milk sugar with lemon or orangeade. If the labor endures for more than twenty-four hours and cannot be brought to a close because of obstetric contraindications, sugar should be given by vein. When the blood pressure is below 85, operative intervention must be postponed until it has been brought to 100 or above. This may be accomplished by the administration of 350 c.c. of gum glucose injected by vein, at a rate not greater than 4 c.c. per minute and at a temperature of 104°. When the blood pressure has been raised to 100, operation may be started.

Of all the forms of delayed labor, the one most difficult to treat is the so-called primary inertia and rigid cervix. It is commonly thought that the Beck type of cesarean section is the answer to this problem, but the loss of immunity from increased exhaustion and acidosis and the entrance of infection through rupture of the membranes and repeated vaginal examinations, are contraindications. Probably the better procedure is to insert a No. 4 bag and pack the vagina with wet gauze, delivering the patient by forceps operation when dilatation has occurred.

The obstetrician must be called to account for that proportion of the maternal deaths due to the conduct of labor. Blood pressure readings and, where possible, checking of the CO<sub>2</sub>, will confirm our clinical diagnosis of acidosis and no anesthesia should be given and no operation should be performed until the blood pressure is 100 or over. This will lead to a diminution of the sudden and obscure deaths that occur at the end of long labors.

#### REFERENCES

(1) Williamson, A. C.: Am. Jour. Obst. and Gynec., 1923, vi, 263. (2) Cannon, Walter B.: Traumatic Shock, Appleton & Co., p. 56. (3) Bailey, Harold: Am. Jour. Obst., 1911, 1xiv, No. 2. (4) Schwarz, O. H.: Am. Jour. Obst. and Gynec., 1923, vi, 656. (5) Williamson, H. C.: Am. Jour. Obst. and Gynec., January, 1926, xi, No. 1. (6) Bailey, Harold, and Williamson, H. C.: Jour. Am. Med. Assn., Dec. 17, 1927, 1xxxix, 2085. (7) Henderson, Yandell: Am. Jour. Physiol., April 1, 1909, xxiv, No. 1.

37 EAST SIXTY-FOURTH STREET.

(For discussion, see page 449.)

# THE BACTERIAL CONTENT OF THE UTERUS AT CESAREAN SECTION. II

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IN THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY for February, 1927, we published a paper entitled "The Bacterial Content of the Uterus at Cesarean Section" which gave the clinical details of a bacteriologic study of fifty uteri at cesarean section. Of these, the cultures were sterile in twenty-eight, while in twenty-two, bacteria of various kinds were found. It is the purpose of the present paper to report the bacteriologic details of the latter twenty-two cases, whose important clinical data are given in Table I.

#### DESCRIPTION OF METHODS

All of the cultures were taken through the uterine incision, in order to insure that they could not be contaminated by the vaginal secretion. As soon as the child was delivered, but before the hands or instruments had been introduced into the lower uterine segment, a sterile cotton-covered swab was passed through the uterine incision and rubbed over the lower uterine segment, care being taken to prevent it coming in contact with any portion of the uterus except that from which the

Table I. GIVING CERTAIN CLINICAL DETAILS CONCERNING THE 22 CASES IN WHICH POSITIVE CULTURES WERE OBTAINED, AND INDICATING THE BACTERIA ISOLATED IN EACH INSTANCE

	DODERLEIN BACILLUS												+											
	VEASTS												+							+				
	C. WELCHII								-						+		+		+					
	VCL. PSEUDONECROPHORUS										-	+			+		+							
	STAPH, AUREUS																	+						+
	STAPH. ALBUS	+					1	+	+					+	+			+	+		+	+		
CULTURE	GAMMA DIPHTHEROID		+				1	+	+		+			_	++		_	+		Г	+	+		_
	BETA DIPHTHEROID				+														+					
UTERINE	VLPHA DIPHTHEROID															+		-	_					_
D	VAVEROBIC GAMMA STREP.					+	+		+		+	-	+	+			+		+				+	
	ANAEROBIC BETA STREP.			+					+								_		+					_
	GAMMA STREP.									-					+		_	-						+
	VEROBIC GVNINA STREP.																_	+						_
	AEROBIC BETA STREP,							+				_						+						_
	VEROBIC ALPHA STREP.										-			+		_	_							
	HEVITING OL INCISION	Excellent	Excellent	Poor	Excellent	Excellent	Poor	Poor	Poor	Stitch	abscesses	Poor	Excellent	Poor	Poor	Excellent	Poor	Poor	Poor	Excellent	Excellent	Excellent	Excellent	Freellont
	MUERPERIUM	Febrile	Febrile	Febrile	Febrile	Febrile	Febrile	Febrile	Febrile	Febrile			Afebrile			Afebrile	Febrile	Febrile	Febrile	Febrile	Febrile	Febrile	Febrile	Pohrilo
	TEMP, AT OPERATION	Normal	Normai	Normal	Normal	Normal	Normal	100.	Normal	Normai		Normai	Normal	Normal	Normal	100.6	101.	.66	99.4	Normal	Normal	101.	102.	1001
	DILATATION OF CERVIX	Closed	2 cm.		Closed	4 em.	4 cm.	10 cm.	3 cm.	2 cm.					10 cm.	10 cm.	3 cm.	3 em.	4	4 em.	10 cm.	63	¢1	-
	RUPTURE OF MEMBRANES	10 hr.	Intact	Intact	Intact	Intact	4 hr.	-	12 hr.	Intact		60 hr.	16 hr.	Intact	28 hr.	3 hr.	41 hr.	10 hr.	55 hr.	Intact	5 hr.	17 hr.	48 hr.	0.4 hm
	AVGIAAL EXAMINATIOUS	0	0	0	0	0	<b>C1</b>	Many	Many	0		0	0	0	Many	0	6.1	01	1	0	Many	0	0	*
_	DURATION OF LABOR	0					19 hr.	hr.	-	hr.	_			hr.	hr.	hr.	hr.	lir.	55 hr.	br.	hr.	17 hr.	hr.	
	CVEE NO.	30	14	49	36	54	34	52	23	2		35	37	51	11	38	44	46	84	41	50	43	28	00

culture was desired. As soon as possible thereafter smears were made from the swab, after which it was inoculated into the following media: anaerobic and aerobic human blood agar plates, anaerobic and aerobic dextrose acid agar plates, cooked meat sealed with vaseline, anaerobic and aerobic human serum bouillon, and aerobic lactose fermented bouillon containing bromcresol-purple as an indicator. The anaerobic plates and bouillon were incubated in the anaerobe jar devised by one of us (J.H.B.2). It should be stated that in no instance were bacteria found in the primary smears which we were not able to grow in culture and to identify.

Unless otherwise stated, the bouillon and agar used were meat infusion media with a reaction of about  $P_{\rm H}$  7.6. The acid agar was infusion agar with a reaction of about  $P_{\rm H}$  6.7. In making the blood agar plates about 0.75 c.c. of defibrinated human blood was added to 12 c.c. of agar at a temperature of 45° C. to 50° C., and the medium was immediately inoculated and poured into Petri dishes. The terms alpha, beta, or gamma always have reference to the appearance of deep colonies in blood agar. Fermented bouillon was prepared by fermenting the meat infusion with B. coli over night at 37° C. before the peptone was added, according to the method of Theobald Smith.³ The carbohydrates were sterilized in 10 per cent aqueous solution, and 0.5 c.c. of the solution was added aseptically to each 5 c.c. tube of fermented bouillon, as well as 5 drops of normal human serum. For the tubes containing maltose, the serum was heated to destroy the maltose-splitting enzyme (Tenbroeck4). After incubation for one week the hydrogen-ion concentrations of the fermentation tests were determined (Brown5).

In the tables the term anaerobic is only used to describe obligate anaerobes; while the term aerobic is applied to all organisms which grow aerobically. Most, if not all, of the latter were facultative organisms.

#### CLASSIFICATION OF BACTERIA

Reference to Table I shows that from the twenty-two infected uteri the fifty strains of bacteria enumerated below were isolated and studied:

Staphylococcus albus	9
Staphylococcus aureus	2
Yeasts	2
Clostridium welchii	3
Döderlein's Bacillus	1
Actinomyces pseudonecrophorous	3
Diphtheroids	12
Streptococci	18
	_
Total	50

Staphylococci.—Passing to the detailed description of the various strains it may be said that the staphylococci isolated need no description, except to state that in each instance the presence or absence of pigment was determined by inoculation upon Loeffler's serum.

Yeasts.—The yeasts found in two cultures are identical with those described as frequent inhabitants of the normal vagina, so that their presence in the uterus in these cases should be regarded as an invasion upward from the vagina.

Clostridium welchii.—From three uteri we isolated a thick, grampositive, encapsulated, sporulating, anaerobic, beta-hemolytic bacillus with bluntly rounded ends. This produced stormy fermentation in milk with digestion of the casein. It also fermented starch, but did not digest egg white in bouillon.

Döderlein's Bacillus.—From one uterus we obtained a large, microaerophilic, nonhemolytic, nonsporulating, gram-positive bacillus with blunt ends. This grew best in acid dextrose agar to which 5 per cent human blood was added, and produced colonies which were slightly greenish in color but without hemolysis. Very slight growth was obtained aerobically, but it became abundant when the media were placed in the anaerobe jar or under reduced oxygen tension. Dextrose, sucrose, lactose, and maltose were fermented, but mannite, salicin, and inulin were not. Gelatin was not liquefied, but both plain and peptone milk was firmly coagulated. In cooked meat sealed with vaseline, large quantities of gas were produced, which upon analysis showed 97 per cent carbon dioxide. This organism was described by Döderlein's and others as a normal inhabitant of the vagina during pregnancy, and in this instance should probably be regarded as another instance of upward invasion from the vagina during labor.

Actinomyces pseudonecrophorus.—From three uteri, Act. pseudonecrophorus was obtained. These three strains, together with three others, namely, one obtained from a uterus the seat of a puerperal infection, one from the cervix during the last month of pregnancy and one found at the autopsy in the broad ligament of a patient dying from puerperal infection, were previously reported by us. Consequently, we shall not repeat the details, except to state that the organism is a nonsporulating, obligate anaerobe, is gram-negative, produces gas in cooked meat sealed with vaseline, and varies greatly in length from almost coccoid forms to long, tortuous filaments. So far as we can ascertain, we were the first investigators to isolate this organism from the human genital tract.

Diphtheroids.—Next in frequency to the streptococci are the diphtheroid organisms, of which we isolated twelve strains from eleven of the fifty uteri cultured. The term diphtheroid is used to include all gram-positive, nonsporulating bacilli of pleomorphic diphtheroid morphology. The strains isolated in this series were all aerobic. In blood agar plates nine strains were of the gamma type, producing neither hemolysis nor discoloration, two of them produced beta zones of hemolysis, while one other produced greenish discoloration with little or no hemolysis.

The methods for studying and classifying the diphtheroids are not so well established as for the streptococci. Up to the present, we have carried out fermentation tests on only three sugars, glucose, maltose and sucrose. The results tabulated in Table II show that among the twelve strains there were at least seven different varieties. Moreover, one variety included four gamma type strains which ferment glucose

TABLE II. BIOLOGIC CHARACTERS OF THE DIPHTHEROIDS FOUND IN NORMAL UTERI

avan Mo	RELATION	TYPE IN	FERMEN	STATION RE	ACTIONS	COOL	KED MEAT
CASE NO.	TO OXYGEN	BLOOD AGAR	GLUCOSE	MALTOSE	SUCROSE	GAS	DIGESTION
38	Aerobic	Alpha	5.0	7.4	7.3	-	-
36	Aerobic	Beta	7.4	7.4	5.2		-
48	Aerobic	Beta	5.7	7.1	7.3	_	_
43	Aerobic	Gamma	7.2	7.2	7.3		
14	Aerobic	Gamma	5.0	7.4	7.4	-	-
25	Aerobic	Gamma	5.4	7.3	7.4	-	_
46	Aerobic	Gamma	6.0	7.3	7.4	-	-
11	Aerobic	Gamma	5.0	7.4	7.4	+	_
11	Aerobie	Gamma	5.8	6.0	7.4	-	_
50	Aerobic	Gamma	5.6	5.8	5.6	100	_
52	Aerobic	Gamma	4.8	5.0	5.0	- These	_
7	Aerobic	Gamma	Not de	termined.			•

Note: The fermentation reactions regarded as positive are italicized.

only, which does not appear to be included among the eleven types described by the British Research Council.<sup>8</sup> We have no reason to suspect that any of the diphtheroids found by us are of pathogenic significance.

Streptococci.—In fourteen of the fifty uteri cultured at the time of operation streptococci were found, and from them eighteen strains of streptococci were isolated and studied. Detailed information concerning them is given in Table III, from which it will be noted that twelve of the strains were strict anaerobes and would not have been detected by the ordinary aerobic methods of culture. Two strains were microaerophilic and grew best under partial oxygen tension; while four strains were aerobic or facultative. The two microaerophilic strains were apparently alike in all the test media employed; they failed to ferment any of the carbohydrates and were equally lacking in proteolytic and pathogenic powers. Three of the anaerobic strains produced beta zones of hemolysis in blood agar plates. No anaerobic alpha strains were found. Nine of the anaerobic strains were of the gamma type and produced neither hemolysis nor discoloration of the medium. One of the anaerobic gamma strains (51) resembled the microaerophilic strains except in its strict anaerobiosis. Two other nonfermenting anaerobic strains (28 and 37) differed from 51 only in their ability to produce gas in cooked meat medium. One of the anaerobic beta strains (25) was also a nonfermenter, but did liquefy gelatin. Two other anaerobic gamma strains (48 and 54) were apparently alike, fermenting only glucose and maltose. Among the other strains, anaerobic and aerobic, there were no duplicates; all showed differences in fermentation reactions or in other characters studied.

If the four aerobic strains are classified according to Holman's classification, the two beta strains must be regarded as Streptococcus pyogenes, the alpha strain as Streptococcus equinus and the gamma strain as Streptococcus ignavus. However, we would prefer to con-

TABLE III. BIOLOGIC CHARACTERS OF THE STREPTOCOCCI FOUND IN NORMAL UTERI

				FER.	FERMENTATION	VILON		RE	REACTIONS	SNS	MILK		COOKED	D	4	PATHO-			
				_							_	1	MEAT	. 1	5	GENICITY	NOMEN-		
NO.	RELATION TO OXYGEN	TYPE IN BLOOD AGAR	GPACOSE	MALTOSE	SUCROSE	PACTOSE	SVEELVOSE	NITANI	MANUITE	RVITCIN	cove*	DIGEST,	SVÐ	DIGEST.	LIQUID.	TIBBLE	CLATURE (HOLMAN <sup>9</sup> OR PREVOT <sup>10</sup> )	DESIGNATION (BROWN11)	Z -
37	Aerobic	Alpha (viridans)	4.7	20	90	7.4		4.7	23	- F		-		-	-		S		
20	Aerobie	Beta	5.0	5.1	5.00	65.		7.33		60.00	+	-		_	+		S. Dvogenes		
46		Beta	6.2	6.4	6.4	9.9	_	7.2		6.3	- 1	1	+	1	_			Aerobie B	-
46		Gamma	5.5	9.9	7.2	7.5	5.5	7.4	7.4	7.2	1	1	-	-	1	_		Aerobic ,	4.6
11	Microaerophilie Ga	Gamma	7.3	61.5	4.7	7.4		7.4	7.4	7.3	1	1	1	-	1	1			
56	Microaerophilic Gamma	Gamma	7.3	2:2	7.4	7.4		7.3	7.4	7.4	1	1	1	1	1	_			
25	Anaerobic	Beta	7.2	7.5	7.4	7.4	7.1	7.5	7.4	7.3	1	1	1	+	1	1		Anaerobic \$ 0.0	0
49	Anaerobic	Beta	5.7	6.0	7.2	6.1		7.4	7.4	7.2	+	1	1	1	-		S. intermedius	560	
48		Beta	0.9	6.3	7.4	6.8		7.4	7.4	6.5	+	-	- -		-		S. intermedius	760	
2		Gamma	Not	ot stu	died								_						
28		Gamma	7.2	7.2	7.2	7.3		7.4	7.4	7.3	1	1	+	1	-	1	Group A1		
37		Gamma	7.2	7.3	7.3	7.2	7.3	7.4	7.4	ci.	1	1	+	1	-	-	Group A1	Anaerobie y	0
51		Gamma	7.5	7.2	7.2	7.3		7.3	7.1	7.1	1	1	1	-	-		S. mieros		
48		Gamma	5.8	0.9	7.2	7.3		7.4	7.4	01	1	-	-	-	-		S. mieros		
54		Gamma	5.5	5.6	6.4	7.5		_	_	7.2	1	-	-	-	1		S. mieros		
25		Gamma	5.3	5.5	65.	7.4	7.2	7.2	7.2	5.3	,	-	+	1	1	+		Anaerobic ,	60
44		Gamma	6.3	7.9	7.2	6.4		7.1	7.1	7.1	+	1	1	-	1		S. mieros		
34	Anaerobie	Gamma	4.8	5.2	4.8	4.8	5.8	5.4	7.3	0.9	1	1	-+	-	1	1		Anaerobic ~ 1	-

Holman utilized only three carbohydrates (mannite, lactose, and salicin) in his classification of the aerobic streptococci. Prevot did not utilize carbohydrate fermentations in his classification of streptococci. Our attempt to identify some of our strains twite those described by him is based upon gas production, coagulation of milk and liquefaction of gelatin. His Group A1 includes three species, S. fetidus, S. anaerobius, and S. putridus. Note: The fermentation reactions regarded as positive are italicized.

fine the latter name to alpha strains. Furthermore, in Table III we have given certain designations from the classification of Prevot<sup>10</sup> which might be applied to some of the anaerobic strains, but we do not find his data sufficiently characteristic to enable us to identify our strains with his.

For the present we do not feel justified in attaching special significance to any of the individual strains of streptococci found, but certain outstanding features may be recognized when these eighteen strains are regarded broadly: (1) The predominance of anaerobic streptococci. (2) The predominance of streptococci of the gamma type in blood agar; the presence of both aerobic and anaerobic beta types; and the almost complete absence of the alpha type. (3) The absence of Streptococcus fecalis and other mannite fermenters, which possibly indicates that the streptococci found in the uterus are not of fecal origin. (4) The low pathogenicity of these streptococci for mice and rabbits.

#### SUMMARY

Of fifty uteri cultured at cesarean section, twenty-two were found infected. With one exception the puerperia of these patients were febrile, but all recovered. In ten cases the incisions healed poorly. From eight of these cases either Actinomyces pseudonecrophorus or beta-hemolytic streptococci were isolated. The incisions of all the patients harboring these organisms healed poorly. Clostridium welchii also was found in three cases, but there was no gross evidence of gas bacillus infection. The gamma type of anaerobic streptococci showed wide differences in fermentation reactions. In one patient (34), whose wound healed poorly, we obtained a pure culture of an anaerobic gamma type streptococcus which was an active fermenter of all the test substances except mannite. There was no obvious relation between the course of the puerperium and the presence of diphtheroid bacilli in the uterus.

#### REFERENCES

(1) Harris, John W., and Brown, J. Howard: AM. JOUR. OBST. AND GYNEC., 1927, xiii, 133. (2) Brown, J. Howard: Jour. Exper. Med., 1921, xxxiii, 677. (3) Smith, Theobald: Centralbl. f. Bakteriol., 1897, Abt. I, xxii, 45. (4) Ten-Broeck, Carl: Jour. Exper. Med., 1920, xxxii, 345. (5) Brown, J. Howard: Jour. Lab. and Clin. Med., 1924, ix, 239. (6) Döderlein, A.: Das Scheidensekret und seine Bedeutung für das Puerperalfieber, Leipzig, 1892. (7) Harris, John W., and Brown, J. Howard: Bull. Johns Hopkins Hospital, 1927, xl, 203. (8) Medical Research Council: Diphtheria, London, 1923. (9) Holman, W. L.: Jour. Med. Res., 1916, xxxiv, 377. (10) Prevot, A. R.: Les Streptocoques Anaerobies, Paris, 1924. (11) Brown, J. Howard: "The Use of Blood Agar for the Study of Streptococci," Monograph, No, 9, The Rockefeller Institute for Medical Research, 1919.

#### CERVICAL INFECTIONS IN THE PUERPERIUM\*

By J. R. GOODALL, M.D., AND MAX WISEMAN, M.D., MONTREAL, QUE.

THIS is an old subject dressed in new clothes, and it is being presented as a new dogma. Quite recently, during the symposium upon puerperal infection at the London Medical Congress, an author of international repute stated that the incidence of morbidity in the puerperium is just as great as before the days of Pasteur and Lister, but that mortality in the puerperium, on the other hand, had fallen very considerably.

It is a fact, well known to those who have reached the meridian, that grave puerperal sepsis has diminished to a very remarkable degree. But puerperal morbidity is still all too frequent a complication, and one may well be astounded and one's interest at once be arrested by this grave statement that morbidity is as prevalent today as in the days before asepsis. It is worth not a little study to be able either to refute or to substantiate such a wide sweeping statement.

The subject matter of this paper was given before the Philadelphia Obstetrical Society in November, 1926. The work was not published, but has been held over until the present in order that the study might be repeated, and the work allowed to mature and stand the test of corroboration. It now appears after almost two years of delay.

The American College of Surgeons has laid down a minimum standard for morbidity; namely, a temperature of 100.4° during any two consecutive days, exclusive of the first day postpartum. We shall ask you to ignore this standard tonight and to substitute another and a more critical one.

Let us take this high standard, to recognize as an expression of morbidity, any temperature that rises above 99 degrees on three consecutive days after the first day postpartum. Then augment this standard by all those cases which, though without temperature whatsoever, yet are morbid—cases which our surgical conscience and our surgical experience tell us indubitably are septic and morbid. Statistics, as you all know, depend for their usefulness or uselessness—we repeat, statistics in their final analysis depend upon the compiler's conscience and experience.

We all know that a very high percentage of morbidity, yes, the great majority of morbid cases, will never be recorded if standardized by the high temperature records as set by the British and American colleges of surgeons. The morbidity as gathered by this standard varies from 2.4 to 12.4. Yet the figures as judged by the standard that we have asked you to set up, which recognizes any temperature

<sup>\*</sup>Read at a meeting of the New York Obstetrical Society, March 13, 1928.

of 99 degrees or over for three days, plus the inclusion of obviously morbid cases without temperature, raises the morbidity in the Hebrew Maternity Hospital from 8.5 per cent to between 30 and 40 per cent.

Let us explain. Upon Goodall's return from an absence of a few days recently, his house surgeon said to him: "This case, sir, is one of pleurisy." We always look upon an acute chest pain in the puerperium as suspicious. We examined the patient carefully and found signs of slight pelvic trouble. Two days later she developed thrombophlebitis of the internal saphenous vein. She had had a temperature for only one day of 100 degrees throughout her whole puerperium, and within the same week we had two such cases of lung infarcts and signs of thrombophlebitis without the temperature rising even to 99 degrees. Such cases do not fall within even the minimum standard of 99 degrees for three consecutive days, and can be included only if the experience of the accoucheur permits of a proper diagnosis, and if his conscience prompts disclosure.

Yet who will doubt the great danger that attends such cases of thrombophlebitis. Personally, we look upon such afebrile thrombophlebitides with the greatest respect, and we breathe more freely as days pass without serious consequences. In fact, we have come to the conclusion that the cases of thrombophlebitis most to be feared are the lowly febrile and the afebrile, or the highly febrile cases when passing into the convalescent stage. I have rarely, if ever, seen a case of embolism in a virulent thrombophlebitis except during the stage of defervescence.

Now, after going over our records and notes, after eliminating everything that is of an extrinsic, extrapelvic nature, and including everything that is definitely pelvic and septic, our morbidity rises to between 30 and 40 per cent. A vast discrepancy, you will state, as compared with 8.5 if taken according to accepted standards.

A critical review of several hundreds of hospital cases has brought out the following interesting facts: that roughly 50 per cent of multiparae, as against 30 per cent of primiparae, show some morbidity in the puerperium. In other words, that every second multipara as compared with every third primipara has an eventful recovery. Many of these morbid conditions are of short duration and remain undiagnosed, but are undoubted infections.

Yet, we fancy, that is just the opposite of what one would expect. There is in the case of the primipara so much more traumatism during labor, labor is usually so much longer, the exhaustion so much greater, the manipulations so much more frequently necessary, that these statistics came as a bit of astonishment. We have lately spoken to some of our confrères, and they were unanimous that recoveries in multiparae are more eventful than the average puerperium of the primiparae. How can we explain the anomaly? The research that follows was not

undertaken with a view to prove or disprove the above statement. The greater incidence of morbidity in multiparae was discovered long after the work was under way. So that the thought could not have influenced the results.

Struck by the frequency with which one met morbidity in the Hebrew Maternity Hospital's public wards-a morbidity marked chiefly by subinvolutions, with or without temperature; or by low temperature with or without increase of pulse rate; or by the frequent incidence of thrombophlebitis in apparently simple, uncomplicated labors—we were prompted to investigate and endeavor to find the cause, or causes. We undertook to examine every woman who showed any morbid state. We had done this in our private practice previously, and had laid the foundation of this work.

The results of these examinations were astonishing. As a rule, we did not examine until the fifth day postpartum, and in most cases not until some sign of morbidity had manifested itself, though there were many exceptions to this rule.

The fact we want to establish is this, that the conditions to be described cannot be attributed to the examination, for most of the morbid states were found at the first examination. Many who showed no appreciable signs of morbidity were found to be infected when examined. In all, 145 cases, private and public, have been submitted to examination, some of them repeatedly, to watch the progress of the infection.

In the vast majority of the morbid cases the lesion was found to be cervical in origin. On examination of these cases, one was struck with the frequency with which one saw a thin, delicate streptococcic membrane covering the os and the cervical canal as far as the eye could see. This membranous development was very thin, and seemed mostly on the surface of the cervical mucosa. It could be easily wiped off without causing any active bleeding. The membrane was found in about 5 per cent of all cases examined. Smears showed streptococci in very large numbers, and in most cases it was the preponderant organism.

In other cases the cervix would be found granulating, bleeding readily on contact, and a mucopurulent discharge escaping from these surfaces, mostly mixed infections. On digital examination, one frequently found a stiffening of the fornix on one side and tenderness on pressure. And yet the presence of this infected area high up, with drainage over a sutured episiotomy, or repair, was not inconsistent with primary union of the perineum.

This condition has been found so repeatedly that not a shadow of doubt can exist as to its frequency and character. During the period of this research only one repaired perineum broke down, and that was in a woman recovering from eclampsia and a version with breech delivery. She had a slight infection higher up, and owing to her greatly lowered resistance, the perineal stitches did not hold.

We attempted to get drawings of these cervical infections, but the picture changes so rapidly that, like throat membranes, today they are present and tomorrow they are gone, and it is only by repeated examinations that one can detect their frequency. In our first examinations we stumbled across the membranous types by mere chance, and later were able to demonstrate them quite frequently.

Endeavor to culture the common organisms of cervical infection, gave us no further information than that which could be obtained from smears. After all, bacteriologists—apart from their work in serology and immunity—have been contented to give us a morphologic classification of microbes—a poor aid to clinicians, you must readily admit. What does the fact that an organism grows in chains or groups mean to clinicians? What does an hemolyzing or non-hemolyzing streptococcus mean to us? To the inexperienced it may carry fear or false sense of security. But to the experienced clinician it means nothing. An hemolyzing streptococcus can be a most in-offensive organism, and the nonhemolyzing can be a most dangerous enemy, and vice versa. So where do bacteriologists stand in their relation to infection?

We are convinced that microbic protoplasm, like human agglomerate protoplasm, is changed by character of food and environment and that through successive generations hereditary characters become permanent, and that an organism once markedly attenuated may not easily regain its previous virulence; organisms divide so rapidly that new properties are prone to become permanent. Just as food and climate (environment) have made the different races, these have become fixed types.

It is our forecast that specificity in microbes is more a matter of virulence or attenuation, coupled with the site of election of infection, than is morphology or any other physical property. If attenuation by unfavorable food does not lead to fixed properties, how can we explain the Calmette immunity tests for tuberculosis? My point is that morphology in bacteriology has no significance in clinical obstetrics. So we abandoned the cultures for the smears, as giving us a better idea of the predominant organism in any given cervical infection.

Argument.—Though our records prove that infections are more common in the multiparae than in the primiparae, yet we know that when infections in the primiparae occur, they are usually more virulent and more dangerous. The reason for the greater frequency and milder type of infection in the multiparae can readily be explained by two factors: first, by the greater incidence of cervical infections in the multiparae, cervical infections antedating the eventful puerperium, and, second, the greater incidence of pathogenic organisms in the

lower genital tract, due to gaping vulva, cystocele and rectocele, and other lesions resulting from earlier pregnancies.

Fulkerson in a recent work pointed out that endocervical infections are found in the multipara and nullipara in the ratio of 93 per cent to 7 per cent, respectively. Of the married women, over 80 per cent had been pregnant. This and the smallness of the nulliparous cases, supports the conclusions that the traumatism of labor and abortion are the chief factors in producing the disease, all of which tends to substantiate the knowledge that the cervix is a frequent offending organ in the puerperium.

What is the real sequence of events? Let us endeavor to outline it. A primipara is recently delivered. She sustains a tear and traumatism of the cervix. They all do. She lies in bed on her back. The vagina is at an angle of 45 degrees with the bed. Drainage is up hill, as it The vault of the vagina remains full of lochia, which she partly empties each time she voids. After the third day postpartum, nearly all authors agree, the lochia is no longer sterile. The cervix is bathed in this infected lochia. The cervix could resist this infection were it intact and healthy, but it has been torn; it is a healing, granulating wound, injured by labor. Is it any wonder then that 80 per cent of parous women suffer from endocervical lesions, of a catarrhal nature-endocervical lesions ready to flare into smouldering activity by the traumatism of a subsequent labor?

An interesting fact, somewhat germane to the subject matter under discussion, is that these cervical lesions are the frequent cause of delay in dilatation of the cervix in multiparae, causing by the irritation of catarrh a spasm, a resistance to dilatation. In such cases morphine or heroin relieves the irritability and spasm and dilatation follows quickly.

May I read an extract from Mr. Victor Bonney on the occasion of the discussion on puerperal sepsis at the Congress of Obstetrics and Gynecology, held last year.

He recalled a paper which he had read before a similar gathering, in which he had advanced the conclusion that puerperal sepsis today was principally autogenetic. He had pointed to the precautions which he had taken for many years against what he called extrinsic infection, and to the fact that in spite of all such precautions the morbidity was very little altered. No one would deny, he adds, the possibility of conveying germs from without into the genital canal, but his contention had been, and still remained, that that occurred in only a small proportion of the

All the measures inculcated by the teachers had for their object the prevention of extrinsic sepsis, and yet the figures advanced that day seemed to prove very conclusively that sepsis was increasing. He noticed that in one of the reports the origin of the sepsis in very many of the cases was not stated. He wished the compilers of these statistics had been a little bolder, and had described these as cases of intrinsic sepsis. If the bulk of puerperal sepsis had been extrinsic, then the measures which had been taken for many years, and recently with increasing

rigour would have occasioned a marked fall in the incidence, whereas any decline had been no greater than one might have expected if only a small proportion of the cases were of extrinsic origin. As a parallel instance, he mentioned that at the Chelsea Hospital for Women in 1900 the mortality rate for major abdominal operations was from 5 to 6 per cent, and by 1906 it has fallen to 1.6 per cent, at about which figure it had remained. During the period 1900 to 1906 gloves had been introduced, and had protected the patient against extrinsic sepsis, but were of no value against intrinsic sepsis, which continued in spite of these measures.

Whitridge Williams stated at that same congress quoted above that it would be unfortunate if the point of view, which regarded puerperal infection as in great part contact infection, were abandoned. If Williams will lay the stress on the words "in great part," not much objection can be raised. But why would it be unfortunate? We think that most of us are ready to assume the blame, if any blame attaches to the handling of a case. But who of us wishes to assume unjustifiable censure?

Not so many years ago, the public blamed the nurse always when septic trouble ensued, and this often, we fear, with the doctor's tacit connivance. Today the pendulum has swung to the other extreme and the physician is held responsible for every untoward symptom of the puerperium, owing to the widespread, yes, almost universal belief that infection is always introduced from without, and implies a culpable breach of technic.

Let us have the truth, the cost will adjust itself. Will the knowledge that infections are frequently intrinsic be used as an excuse for any laxness in present aseptic technic? We think not. That many of these infections are intrinsic and cervical is further borne out by the study of subinvolution. Subinvolution is probably the most common complication of the puerperium. It is always a result of something antecedent. How often (in the absence of other signs) we hear clinicians say it is the result of multiparity, or too frequent child-bearing. We have examined many of these and nearly always find the cause to be unsuspected cervical infection. Moreover, this is further confirmed by Goodall's researches in chronic metritis, which, as you all know, is the result of a neglected subinvolution, and therefore the result of an infected pregnancy.

In nearly all the cases of chronic metritis the cervix is involved in a process which is generally spoken of as chronic cervicitis. The cervix is hard, cystic, enlarged, and its infection is the primary cause of the continued subinvolution of the superimposed uterus. This is not a mere accidental association of a diseased cervix and a diseased uterus. In the vast majority of cases the primary lesion is the cervical disease.

One of us spent many years of research to bring our knowledge of the puerperal uterus and of chronic metritis to a finality. The term chronic metritis is a misnomer, for the process is not an inflammation, but a lack of destruction and a lack of absorption of superfluous, useless tissue, following a miscarriage or full-term labor. In the presence of infection, the more delicate and more highly organized muscle succumbs, but the more resistant, less highly organized connective tissues remain. The first stage is a large, soft uterus; the last stage is a large, hard uterus. It should be termed chronic subinvolution.

The uterus weighs approximately 1000 grams immediately after labor, and the uterus in the quiescent stage weighs about 75 grams, so that the puerperal woman has to get rid of about 900 grams of superfluous tissue. Two factors enter into the destructive process, namely, contraction and retraction, and one factor enters into absorption, the activity of cell metabolism. Infection arrests both retraction and contraction of the uterus, and thereby arrests destruction.

Now we have found that in most cases of subinvolution there is a silent infection of the cervical canal, occasionally membranous, and that it is the continuation of this which leads to hypertrophy of the cervix, and the chronic subinvolution is the result. Of course many cases of chronic metritis are primarily uterine in origin, especially those following an infected abortion. But has it never struck you how frequently chronic metritis is uncomplicated by any peritoneal, adnexal, or parametrial disease? Only the cervix is involved, and the cervical condition, with its hypertrophy and cystic disease, is a perfect picture of infection.

Treatment.—It will be gathered from the foregoing that there are intrinsic and extrinsic infections. There is nothing new to be added to preventive measures used to bring about complete asepsis of the external genitals. And the knowledge that some infections are intrinsic should not justify one in relaxing one iota in making his surgical technic as perfect as possible.

Of the intrinsic infections, I think from what has gone before, we must divide the eases into two groups. The first group will consist of those cases in which the vagina is the harbinger of pathogenetic organisms, but these have not been long enough in the genitals to secure an implantation. They have had access to the home, so to speak, but are not of the household. The inner genitals are the harbingers but not the host; among the common causes are self-infection and intercourse. Then there is the second great group, much the more frequent in our experience, in which there is a definite microbic disease of the cervix, with the pathogenetic organism in the tissues in a latent or dormant stage. To overcome the former group of pathogenetic organisms free in the genitals, we have adopted a form of treatment, which so far has given us very encouraging results. Dr. Mayes, of Brooklyn, has carried out practically the same treatment with apparently the same encouraging results.

Our treatment consisted in shaving and performing external toilet of the vulva after the usual enema. When this was completed, a sterile glass catheter was passed into the vagina up to the cervix, and the vagina filled with a 2 per cent mercurochrome solution, and the vulva painted with the same strength of solution. Mayes used 4 per cent solution and repeated the vaginal injection if labor was unduly prolonged. We heartily approve of this. The same technic has been carried out in 100 cases with 100 controls in the Royal Victoria Hospital, with very gratifying similar results.

Moreover, our patients received daily an intravaginal injection of 2 per cent solution throughout the first seven days of the puerperium. There has been only one case of fetid lochia since this practice was adopted. The incidence of mild infection has been considerably reduced and complications lessened. Stay in the hospital has been greatly lessened, and in all of these factors Mayes' work and our work are in complete accord.

In the second group of cases, where an endocervical infection antedated labor, unfortunately treatment of any kind will bear but lightly upon this type of infection. The microorganisms are latent, dormant, in the catarrhal and diseased cervix. They may remain dormant for years, producing slow, progressive hypertrophy of tissues by their irritating action. These, under the influence of the traumatism of labor, light into activity, and we think are accountable for the great majority of intrinsic infections during the puerperium—more especially are they accountable for the attenuated infection with slight morbidity, and therefore for many of the silent or semi-silent thrombophlebitides. The symptoms arising out of this type of infection are usually slight, but frequently prolonged, because they are seldom acute.

These are met with mostly in the multiparae. Vaginal injections will not materially alter their action, for they are already in the tissues. But injections, we can conceive, might prevent or minimize reimplantation upon new raw surfaces. We fear that the only treatment that will materially diminish this type of case must antedate the pregnancy.

We wish to put forth an ardent plea for active treatment of every form of endocervicitis, by cautery and amputation, to remove areas of ectropion, and we especially urge that this form of treatment should follow as soon as judicious upon the labor and puerperium. Undoubtedly, the vast majority of such cases date their initial lesion and infection to the tears and traumatism of labor, and to subsequent infection of these traumatized areas by the infected lochia after the third day postpartum. In our service every patient is examined with speculum on discharge and also six weeks later. Treatment is applied from six to eight weeks postpartum.

To recapitulate.—Morbidity from childbirth does not seem to have appreciably changed in totality since the days before antisepsis and

asepsis, but morbidity has changed very appreciably in character. The severe types have been very considerably reduced, except in cases of induced abortions. This change is due to the improved technic and the lessened extrinsic infection. The high percentage of virulent infection in induced abortions bespeaks a lack of aseptic technic, and is a vivid reminder of morbid conditions in obstetries well within the recollection of most of us.

The present day high percentage of morbidity of the less virulent types, the higher percentage of morbidity in multiparae as compared with primiparae; the marked frequency of subinvolution without readily appreciable cause; the common occurrence of thrombophlebitis of the pelvic vessels without involvement of other tissues than the veins; the frequency of remote thrombophlebitides, all argue for an attenuated infection, and for an agency that is beyond the reach of our almost perfect vulvar aseptic technic.

The frequency with which we have been able to demonstrate primary infection in the cervix in the early days of the puerperium, and the higher incidence of morbidity in the multiparae; the incidence of cervical infection in cases of subinvolution, without other symptoms, and lastly the marked association of grave cervical alteration in cases of chronic metritis, all lend support to the hypothesis that chronic endocervicitis and cervicitis are the underlying causes of most of the mild cases of morbidity which prevail today in all the clinics.

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(For discussion, see page 440.)

Schneider, G. H.: The Question of Rectal or Vaginal Examination in Obstetrics and Gynecology. Monatsschrift für Geburtshilfe und Gynäkologie, 1927, lxxvii, 401.

In the opinion of the author, vaginal examinations in obstetrics should be made only for a therapeutic purpose, and be avoided for diagnostic purposes alone. However, before every vaginal operation, this form of examination must be made for it cannot be replaced by a rectal examination. For gynecologic purposes, a rectovaginal examination is better than a rectal or a vaginal one alone.

J. P. GREENHILL.

# CYSTIC CERVICITIS, WITH SPECIAL REFERENCE TO TREATMENT BY CAUTERIZATION

A CLINICAL STUDY OF 1031 CASES

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THE successful treatment of chronic cystic cervicitis consists in the eradication of the mucous glands of the cervix. The glandular tissue may be removed by amputation of the cervix or by thorough cauterization.

The histories in the Mayo Clinic of cases diagnosed cystic cervicitis were studied in order to evaluate the results following cauterization of the cervix. The results were compared with those of a series of cases in which the cervix was amputated for the same condition. Only those cases were studied in which the cervix was so extensively involved that hospital care and treatment under an anesthetic were necessary. Lesions that could be treated by local applications of antiseptics, caustics, or astringents were not included nor were cases in which cauterization could be carried out in the office. Cases in which amputation of the cervix for prolapse had been performed, even though the cervix was cystic, were not included in the comparison.

The two groups were analyzed as to age incidence, marital state, pregnancies, cardinal symptoms, symptoms referable to the pelvis, complicating disorders and variations in menstruation. An attempt was made to determine a criterion whereby it would be possible to decide whether amputation or cautery was indicated in specific cases.

In the investigation questionnaires were sent only to patients in the child-bearing age whose conditions would not prevent conception or pregnancy. Cases in which treatment with radium or roentgen rays had been given were excluded, also those in which ligation of the tubes, ovarectomy, or hysterectomy had been performed. In evaluating the results, an analysis was made of the general health of the patient, the improvement of the pelvic symptoms, the necessity for subsequent treatment, if any, and the number of subsequent pregnancies.

#### INCIDENCE

During the period from 1919 to 1926 inclusive, approximately 226,900 women were examined for all conditions. Cystic cervicitis was sufficiently marked to be diagnosed by the general history in only 2368

cases (1.05 per cent). Of 1031 of these cases diagnosed cystic cervicitis, surgically or pathologically, treatment was carried out in 550 (53.5 per cent) by cautery to the cervix and in 481 (46.5 per cent) by amputation of the cervix. In 1337 there were complicating conditions which were treated either medically or surgically. Excluding amputations of the cervix for prolapse, and cautery after the removal of cervical polyps, there remain 661 cases of cervicitis treated in the hospital, 366 (55.5 per cent) by cautery and 295 (44.5 per cent) by amputation. This group of cases is the basis for our study.

The incidence of cervicitis found in women examined at the Mayo Clinic seems small when compared with statistics compiled in gynecologic clinics elsewhere. At Cornell University Clinic the incidence reported by Fulkerton was 33 per cent, at the Long Island College Hospital, Mathews reported 75 per cent, and at the Woman's Hospital, New York, Rawls reported cervical operation in 11 per cent of 6503 patients examined for gynecologic disorders.

The small incidence at the Mayo Clinic may be accounted for in several ways. The clinic is situated in a small city, and the majority of patients come from a considerable distance, so that fewer patients come for minor complaints than come to city dispensaries. The communities from which the patients come are peopled by thrifty farmers whose wives are healthy, free from infection, and who do not consult a physician unless their complaints are quite annoying. If cervicitis, giving few if any symptoms, is present in a case in which there is a more urgent condition, it is usually not treated. However, since the cervix in married women is examined as a routine, it is doubtful if any severely infected cervix would escape diagnosis.

In considering the female population as a whole, it is probable that these statistics represent fairly accurately the incidence of cystic cervicitis. The patients in the large gynecologic clinics are there because of a pelvic complaint; these represent a small proportion of the general population.

#### AGE INCIDENCE

The age incidence in cases of cystic cervicitis treated surgically at the Mayo Clinic has been determined. Two patients (0.3 per cent) aged less than twenty were treated by cauterization. Forty-three patients (6 per cent) between twenty and thirty were treated by cauterization, and thirty-nine (5.9 per cent) were treated by amputation. One hundred fifty-six (23.6 per cent) between thirty-one and forty were treated by cauterization, and 126 (19 per cent) were treated by amputation. One hundred thirty-six (20.6 per cent) between forty-one and fifty were treated by cauterization, and 115 (17.5 per cent) by amputation. Thirty-one (4.7 per cent) between fifty-one and sixty years were treated by cauterization, and sixteen (2.4 per cent) by amputation.

Fifty-four and eight-tenths per cent of the patients treated by eautery for cervicitis were aged less than forty; 56 per cent treated by amputation of the cervix were less than forty. The fact that almost half the patients were more than forty, that is, past the most productive period, is not an indication that cervicitis does not occur frequently in younger women, but that the more conservative methods of local medication or cautery in the office are attempted at this age. Injuries and inflammations can be rendered harmless and practically symptomless in the younger woman by delicate linear cauterization in the office. Operative measures are not advised unless the condition has advanced to the stage at which such treatment has become ineffective.

### MARITAL STATE AND NUMBER OF PREGNANCIES

Ten of the patients treated by cauterization and two treated by amputation were unmarried; thirty-one treated by cauterization and eight treated by amputation were married but childless; eighty-eight treated by cauterization and fifty-seven treated by amputation had one child; seventy-four treated by cauterization and seventy-eight treated by amputation had two children; forty-three treated by cauterization and forty-two treated by amputation had three children, and 110 treated by cauterization and eighty-six treated by amputation had four or more Eighteen patients treated by cauterization and twenty children. patients treated by amputation had had one miscarriage; eighteen treated by cauterization and ten treated by amputation had had two miscarriages, and fourteen treated by cauterization and sixteen treated by amputation had had three or more miscarriages. In two of the eases in which cauterization was employed and in seven in which amputation was employed there had been one stillbirth. In two cases in which cauterization was employed and in one in which amputation was employed there had been two stillbirths.

Of the entire group 7.7 per cent had not borne children, 22.7 per cent had had one child or one miscarriage, 69.6 per cent had had multiple pregnancies; 32.2 per cent had had more than three children. Cautery was employed more often in cases of sterility than was amputation of the cervix. The number of married women without children was small, and only fifteen of the patients mentioned sterility as a complaint. Fulkerton reported 19.9 per cent sterile marriages in his series. The conclusion is that trauma due to multiple pregnancies is an important factor in cystic cervicitis.

#### SYMPTOMS

Leucorrhea.—Leucorrhea is the most constant finding in eases of infection of the cervix. Often it is not the chief complaint, because many multiparous women do not consider it abnormal, since they are accustomed to its presence. Leucorrhea usually exists if the patient complains

of lacerations, "ulcer of the womb" or pruritus. Cases in which leucorrhea has been considered the most prominent symptom have been grouped together.

Fifty-six patients treated by cauterization and thirty-four treated by amputation complained of leucorrhea; twelve treated by cauterization and seventeen by amputation complained of lacerations; seventeen treated by cauterization and ten by amputation complained of "ulcer of the womb," and six treated by cauterization and four treated by amputation complained of pruritus vulvae.

Although leucorrhea was the chief complaint in only 23 per cent of the cases in the entire series it was present in 51 per cent of the cases to a degree sufficient to lead the examining physician to grade it from 1 to 4 depending on the amount.

Leucorrhea, graded 1, was present in sixty-eight cases (18.6 per cent) in which cauterization was employed, and in forty (13.5 per cent) in which amputation was employed. Leucorrhea, graded 2, was present in seventy cases (19.2 per cent) in which cauterization was employed and in fifty-four (12.5 per cent) in which amputation was performed. Leucorrhea, graded 3, was present in forty-four (12 per cent) in which cauterization was employed and in thirty-seven (12.5 per cent) in which amputation was performed. Leucorrhea, graded 4, was present in eleven (3.1 per cent) of cases in which cauterization was employed and in six (2.2 per cent) in which amputation was performed. Leucorrhea, of any grade, was therefore present in 52.9 per cent of cases in which cauterization was employed and in 46.8 per cent of cases in which amputation was performed.

In a comparison of the two groups, it will be seen that leucorrhea was the complaint in a larger percentage of cases in which the cervix was cauterized. The difference is not great enough to be significant, or to lead to the conclusion that cauterization rather than amputation is indicated in any case of leucorrhea.

Menstrual Disorders.—The relation of menstrual disorders to cystic cervicitis is probably remote. Behny states that menorrhagia may be due to cervical infection and reports "cures" of menorrhagia in 63 per cent of a small series of cases after cauterization of the cervix. Miller believes that menstrual derangements are rather common as a result of secondary hyperplasia, circulatory stasis, and secondary ovarian involvement. In our series, the chief complaint in 24 per cent of the cases was referable to menstruation.

Thirty patients treated by cauterization and ten treated by amputation complained of menorrhagia; twenty-four treated by cauterization and eleven treated by amputation complained of metrorrhagia; thirteen treated by cauterization and seventeen treated by operation complained of irregular menses; fifteen treated by cauterization and fifteen treated by amputation complained of "menstrual trouble," and fifteen treated by cauterization and eight treated by amputation complained of dysmenorrhea.

Although irregularities in menstruation were the chief complaint in only about one-fourth of the cases, a larger number of patients admitted deviations from normal when specifically questioned. More than one abnormality was present in some cases.

In eighty-five cases in which cauterization was employed and 112 in which amputation was performed (30 per cent) menstruation was normal; in 120 in which cauterization was employed and eighty-seven in which amputation was performed (31.4 per cent) menstruation was irregular; in 146 in which cauterization was employed and in seventy-one in which amputation was performed (32.7 per cent) menorrhagia was present; in fifty-nine in which cauterization was employed and twenty-one in which amputation was performed (12.21 per cent) metrorrhagia was present; and in eighty-two in which cauterization was performed and in sixty-two in which amputation was performed (21.8 per cent) dysmenorrhea was present.

Pain.—The normal cervix is insensitive to pain. However, it is often pain, real or imagined, which brings the patient for examination. Bilateral pelvie pain was complained of by fourteen patients treated by eauterization and eight treated by amputation; abdominal pain was complained of by twelve treated by eauterization and fourteen treated by amputation; pain in the right lower abdomen was complained of by fifteen treated by eauterization and twelve treated by amputation; pain in the left lower abdomen was complained of by sixteen treated by cauterization and thirteen treated by amputation; backache was complained of by thirty patients treated by cauterization and twenty-two treated by amputation; leg ache was complained of by five patients treated by cauterization and four treated by amputation, and dyspareunia was complained of by four treated by cauterization and five treated by amputation.

About one-fourth of the patients did not complain of pelvic disorders, but of general symptoms, such as nervousness, fatigue, stomach trouble, constipation, headache, neuritis, and heart trouble. In seventeen cases the cervix was cauterized and in thirteen it was amputated because of arthritis. Forty-five patients feared cancer or cancer had been diagnosed elsewhere.

Backache was a complaint in 18.4 per cent of the eases; in only a few cases was it the chief complaint. It was a complaint in 16.6 per cent of the series in which cautery was used and in 20.7 per cent of the series in which amputation was performed. Lynch states that backache, as a gynecologic symptom, is due chiefly to pelvic congestion and that slight defects in posture may favor its development. He reports

that 71 per cent of the women with marked vaginal relaxation aged less than forty complained of backache which was cured after operation in 79 per cent of the cases. In considering the prevalence of backache among women who have borne children, it does not seem logical to base the complaint on the condition of the cervix alone.

#### PATHOLOGIC OBSERVATIONS

All cervical tissue removed was examined microscopically. In most of the cases in which the cervix was cauterized, no specimen was removed unless there was suspicion of malignant disease. Two hundred eighty-three microscopic examinations were made in the 661 cases. The pathologic report in 187 (66.8 per cent) was cystic cervicitis, in seventy-seven (24 per cent), cystic cervicitis with erosion, in nine, hypertrophic cystic cervicitis, and in ten it was simply stated that the tissue was not malignant. In none of these cases was carcinoma found. In studying the pathologic reports of carcinoma of the cervix it was found that in only two cases had carcinoma been reported in a cystic cervix.

Cystic cervicitis is the condition resulting from laceration and subsequent infection or trauma from repeated infections. The embryologic development and the normal histology of the cervix explain why cyst is possible. Moench has recently discussed cervicitis from the standpoint of pathology, and explains cyst formation in detail. The cysts may be caused by inflammatory obstruction of the ducts of the cervical glands, or by the closure of these ducts by pressure from an inflammatory reaction, as erosions in the first stage of healing. They may also arise from glands whose ducts are covered by squamous epithelium in the second stage of healing of an erosion, or from islands of columnar or squamous-cell epithelium displaced or buried by trauma, usually resulting from lacerations of the cervix.

The point to be emphasized here is that cystic cervicitis is not a simple infection, inflammation, or erosion, but is a process in which these factors have persisted until the final stage of cyst formation is the result, and must be treated as such.

#### TREATMENT

The accompanying chart (Fig. 1) shows the number of cases treated each year by cautery and by amputation. It is interesting to note that since 1924 cautery has been the favored method. Various operations were carried out at the same time as amputation or cauterization of the cervix and they are listed in Table I.

In many cases the cervix was cauterized during the course of other more extensive operations, but these were not included in this study. The figures show that amputation of the cervix rather than cautery is used when another condition exists which requires operation. If

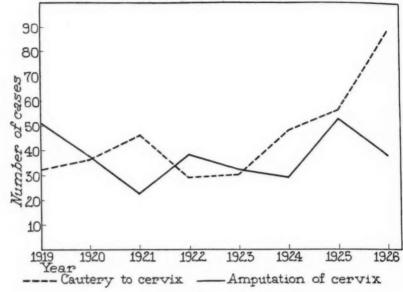


Fig. 1.

perineorrhaphy is indicated, the surgeon usually prefers to amputate a cervix which in itself could be treated either by thorough cauterization or by amputation.

In the majority of cases in which amputation is indicated, the Sturm-dorf type is advisable. At the Mayo Clinic amputation is seldom advised except for a patient near the age of the menopause or for one who does not anticipate pregnancy. The thorough cauterization indicated in this type of case is a different procedure from the linear cauterization so often recommended as treatment which can be carried out in the office. The patient must be thoroughly anesthetized or the operative field must be blocked off by parasaeral or caudal anesthesia. All cysts are punctured and their walls thoroughly destroyed. If there is much hypertrophy of the cervix or if there is eversion of the endo-

Table I. Surgical Procedures Carried out With Amputation or Cauterization of the Cervix

		IZATION PER CENT	CASES	UTATION PER CENT
Cautery only	98	26.8		
Amputation only			91	30.9
Dilatation and curettage	175	48.0	72	24.4
Dilatation, curettage, and perineorrhaphy	22	6.0	28	9.1
Perineorrhaphy	27	7.4	100	34.0
Uterine suspension: internal	21		40	
Uterine suspension: external	6		5	
Bovee operation	0		17	
Removal of caruncle	1		1	
Excision of bartholin gland cyst	3		1	
Repair of anal sphineter	2		3	
Plastic operation on vagina	3			

cervix, it is advisable to make about six deep punctures parallel to the cervical canal with the idea of destroying considerable tissue but not interfering extensively with the blood supply to the endocervix. For the first two weeks after this procedure the cervix looks ragged and sometimes there is considerable necrosis with a slight tendency to secondary hemorrhage. Within six weeks, however, the cervix will be contracted to less than normal size and somewhat shortened. The hypertrophied everted condition of the endocervix will have disappeared and the cervix will appear much the same as after low amputation.

#### IMMEDIATE RESULTS

Severe hemorrhage from the cauterized cervix enough to require a vaginal pack for control occurred in nine cases. In four cases the hemorrhage occurred on the twelfth day, in two on the thirteenth, in one on the sixteenth, and in two on the twentieth. There were six hemorrhages from the stump of the amputated cervix; in two cases the wound was resutured on the seventh day after operation, in two it was packed on the tenth day; in one of these cases hemorrhage was so severe that transfusion was required, and in two severe hemorrhages occurred three weeks after operation, after the patients had returned home.

The tendency to hemorrhage is slightly more marked after cautery, and it occurs from ten to fourteen days following the procedure. The slough which has formed separates, exposing the newly formed granulation tissue beneath. The bleeding is usually not more than spotting, but hemorrhage may occur, and for this reason the patient should be under observation for at least two weeks after cauterization. Hemorrhage may be controlled, as a rule, by a loose pack in the vault of the vagina but in ease of free hemorrhage compression of the cervix by a tight vaginal pack or suture may be necessary.

Pelvic abscess occurred in three cases following cautery to the cervix, and in the same number after amputation. In each case there was a history of previous pelvic inflammation. In one case phlebitis followed amputation of the cervix.

#### RESULTS

The results are based on 227 replies to questionnaires, twenty-eight letters written previously by patients who did not reply to the questionnaire, and forty-five subsequent examinations.

General Health.—Fifty-three (33.5 per cent) of the patients treated by cauterization were entirely well, twenty-six (16.5 per cent) were improved and seventy-nine (50 per cent) were not well. Forty (28 per cent) of those treated by amputation were entirely well, eighteen (12.7 per cent) were improved and eighty-four (58 per cent) were not well. Many of these had complaints not referable to the pelvis Seventy-two did not give the nature of their illnesses; three had general-

ized aches and pains, eight backache, five lower abdominal pain, nine fatigue and weakness, three stomach trouble, three bladder trouble, four nervousness, two rectal pain, one cardiac pain, two hay fever, and four insomnia. Those who were considered neurotic before the operation continued to complain afterward.

Pelvic Condition.—Many of those who were not perfectly well stated that the condition they complained of at the time of the treatment of the cervix was improved. Fifty-three patients treated by cauterization reported that the pelvic condition was definitely improved, eighteen that it was somewhat improved, and eighteen that it was no better. Forty-six patients treated by amputation reported that the pelvic condition was definitely improved, eleven that it was somewhat improved, and twelve that it was no better. Fewer patients on whom amputation of the cervix was performed considered themselves perfectly well, and fewer of them considered the condition they complained of improved.

Leucorrhea.—Leucorrhea is effectively eliminated by either cauterization or amputation of the cervix. The percentage of cures is slightly greater in cases in which the cervix was amputated, and there were fewer cases in which the leucorrhea returned. However, fewer of that group of patients complained of leucorrhea.

In the group of cases in which cauterization was employed, leucorrhea ceased in 101 (72.8 per cent), it was decreased in twenty-six (18.7 per cent), and was unchanged in twelve (8.6 per cent). In the group of cases in which amputation was performed, leucorrhea ceased in 107 (76.5 per cent), it was decreased in seven (5 per cent) and was unchanged in twenty-six (18.5 per cent). In twenty-four cases in which cauterization was employed and twelve cases in which amputation was performed leucorrhea returned less than three months after treatment. In four cases in which cauterization was performed and two cases in which amputation was performed leucorrhea returned in less than a year, and in nine cases in which cauterization was employed and four-teen cases in which amputation was performed, leucorrhea returned after a year.

Menstrual Irregularities.—Menstrual irregularities were not complained of in the letters received. In reply to a direct question in regard to irregular vaginal bleeding, six of those in the group in which cautery was used complained of a bloody vaginal discharge, and four of those in the group in which amputation was employed. In these cases hysterectomy had been performed since operation on the cervix but in none was a malignant lesion found.

Nine patients in each group remembered occasional intermenstrual bleeding at a previous time. Nine of the patients in the group in which cautery was used and twelve in the group in which amputation was performed had noted a premenstrual bloody discharge. Menorrhagia can be assumed to have been the cause for the treatment by radium in the fourteen cases in which it was used subsequent to operation on the cervix. Dysmenorrhea was complained of in only two cases in each group following operation on the cervix.

Subsequent Treatment to the Cervix.—There were forty-five patients who wrote that they had received treatment at home subsequent to operation here. Following cautery, local treatment to the cervix was given in twelve cases, roentgen-ray treatment in two, radium in ten, chiropractic manipulations in two, hysterectomy was performed in two, myomectomy in one and ovarectomy in one. Following amputation local treatment was given at home in eight cases, radium in four, hysterectomy was performed in seven, and myomectomy in two, and only in these could the local condition of the cervix be investigated; forty-five returned for examination. Following cauterization a wellhealed, normal appearing cervix was present in sixteen cases, local treatment was advised in twelve; suspicious areas removed for microscopic examination proved to be benign in two. Following amputation, the cervix was perfectly healed in five cases, cicatrices requiring dilatation were present in three, and the cervix was unhealed and required cauterization in four.

There is no report of carcinoma developing in any of these cases of cystic cervicitis, although seven years have elapsed since the first cases were treated, and more than a year since the last ones. These patients are at the age when carcinoma is most commonly diagnosed.

Pregnancy.—Sterility was the chief complaint in only eleven cases (3.2 per cent) in which cauterization was employed and in only four (1.4 per cent) in which amputation was performed. One woman bore two children after cautery for sterility, and another woman bore one child after amputation of an infected cervix which was considered the cause of her sterility. Both women believed that the operation made it possible for them to bear children. Since operation, there were four women in each group who still complained of sterility.

There were forty-six women who became pregnant, twenty-nine after cautery and seventeen after amputation of the cervix. Pregnancy occurs more frequently following cautery to the cervix than after

Table II. Pregnancy and Labor Following Surgical Treatment of Cystic Cervicitis

*	CAUTERIZATION	AMPUTATION
Delivery without instruments or repair	17	3
Delivery with forceps, without repair	5	4
Delivery with instruments followed by repair	2	4
Now pregnant	2	1
Stillbirth	1	1
Twins	1	1
Cesarean section	0	2

amputation. Miscarriages are less frequent. Labor occurs normally in more cases, and repair is not necessary so often (Table II). Of the patients treated by cauterization eighteen later had children, and eight had miscarriages. In all, twenty-six children were born. Of the patients treated by amputation nine later had children and six had miscarriages. In all, thirteen children were born. Cesarean section was necessary in two cases after amputation of the cervix. In one case it was performed after test of labor; the mother had previously given birth to two children normally. In the other, twins were diagnosed in poor position. One patient whose cervix was cauterized gave birth to twins normally.

#### SUMMARY AND CONCLUSIONS

The incidence of cystic cervicitis is less than is usually reported, occurring in 2368 cases, or in 1.05 per cent of 226,900 women examined.

The symptoms presented as the chief complaint were leucorrhea (23 per cent), menstrual irregularities (23.4 per cent), pelvic pain (23.2 per cent), and irrelevant symptoms (30 per cent).

The indications for cautery or amputation of a hypertrophied, eroded, eystic cervix depend on the local condition of the cervix, and not on symptoms. Other things being equal, if other operations are to be carried out at the same time, amputation rather than thorough cauterization is advisable.

Cautery is as effective as amputation in the cure of leucorrhea.

The general health is not dependent on the cervical condition to any great extent.

Pregnancy occurs more frequently, miscarriages are less frequent, labor is more often normal and lacerations occur less frequently following thorough cauterization of the cervix than following amputation of the cervix.

There is no clinical evidence that cystic cervicitis in itself is a precancerous condition.

#### REFERENCES

<sup>(1)</sup> Behney, C. A.: Surg. Clin. N. Amer., 1926, vi, 109-111. (2) Fulkerson, L. L.: Am. Jour. Obst. and Gynec., 1926, xii, 374-385. (3) Lynch, F. W.:. Am. Jour. Obst. and Gynec., 1926, xii, 719-728. (4) Mathews, H. B.: Am. Jour. Obst. and Gynec., 1926, xii, 422. (5) Miller, C. J.: Jour. Am. Med. Assn., 1926, lxxxvii, 1695-1697. (6) Moench, G. L.: Am. Jour. Obst. and Gynec., 1926, xi, 453-461. (7) Rawls, R. M.: Am. Jour. Obst. and Gynec., 1922, iii, 1-20.

# THE CONTROL OF POSTOPERATIVE HEMORRHAGE FOLLOW-ING NEPHROTOMY FOR THE REMOVAL OF CALCULI\*

BY DOUGAL BISSELL, M.D., NEW YORK, N. Y.

TEPHROLITHOTOMY technic during my early experience in renal N EPHROLITHOTOSIT teening damage and surgery, namely, that of incising the kidney longitudinally and removing calculi through the opening made, seemed so sanguinary and formidable with added risk of postoperative hemorrhage that I shrank when contemplating its performance. Ten years later (1901) when the roentgen rays were becoming an aid in determining and locating calculi, there came under my care a young girl with a definite shadow of a stone, about 2 by 1 cm. located in an upper calyx, and a second shadow, faint and small, located in the upper ureter. It was then that I conceived the idea, that by incising the upper ureter I could avoid hemorrhage, and through the opening made explore the kidney pelvis and upper ureter and remove all stones. After delivering the kidney and freeing the ureter from its cellular attachments to the renal vessels, an incision 2 cm. in length was made through the ureter near to and parallel with the crescentic curve of the kidney. On depressing the ureteral flap, access to the kidney pelvis and upper ureter through the ureteral opening was made easy. As vision was not obstructed by blood, both stones were easily found where located by roentgen examination and removed without difficulty. The crescentic incision was then closed with six interrupted very fine plain catgut sutures, and a provisional drain of narrow gauze was placed in the immediate vicinity of the ureteral incision. The operation was performed with surprising ease and no shock to the patient. Her convalescence was uninterrupted. The drain was removed after the third day with no evidence of urinary leakage. The wound healed elsewhere by primary union.

I continued to use this ureteropyelolithotomy technic until 1916 when there came under my care a patient with a large calculus in the pelvis of the left kidney, the largest I had ever attempted to remove in this manner. The ureteral opening was made supposedly big enough to accommodate the stone, but delivery through it occasioned an irregular tear of the ureteral wall which rendered repair difficult, resulting finally in urinary leakage and a persistent urinary fistula. The ultimate history of this case discouraged me regarding the ureteropyelolithotomy technic, for nephrectomy was eventually necessary to cure the patient.

<sup>\*</sup>Read before the Surgical Section of the New York Academy of Medicine, February 4, 1998

It might be said in passing that while this failure discouraged me in continuing the use of the ureteral route for the removal of kidney calculi located in the kidney pelvis, it should not have done so, but should have served only as a lesson to help me determine the kind of case in which ureterotomy for the removal of renal calculi is not indicated. However, because of this unhappy experience, my attention was directed to the development of a safer technic than that commonly adopted in removing renal calculi through a longitudinal incision of the kidney structure.

The features of the technic to be described and to which discussion is particularly directed, pertain especially to the closure of the renal incision and to the encircling removable sutures to be tightened, should occasion demand it, to ensure hemostasis.

The initial approach to the kidney through the lumbar region varied from that I formerly used, but only in respect to the fascial incision in the upper triangle. I now prefer to begin the incision of this fascia below the last dorsal nerve instead of above it, as by so doing there is less liability of injuring the nerve when extending the incision downward.

On delivering the kidney, the ureter was freed from its cellular attachment to the renal vessels, and one of the blades of a rubber ring forceps protected with rubber was passed between the freed ureter and vessels, and moderate compression made on the vessels (a, Fig. 1). When the median longitudinal incision was made through the kidney structure, pressure of the forceps was increased as found necessary to control hemorrhage. Care was taken not to crush the vessels to the degree of traumatizing their walls. The use of the fingers for the use of controlling the blood supply to the kidney when operating, is perhaps preferable to the forceps, but they tire quickly and the hand crowds the field of work.

With the kidney delivered and the vessels compressed a median longitudinal incision is made through it. The position and approximate size of the stone is determined by the finger or instrument passed into the pelvis, and the pelvic opening enlarged as found necessary to accomplish the delivery without tissue injury.

Before incising the kidney, care should be taken to protect the wound by placing gauze around the organ. After delivering the stone, irrigation of the pelvis is advisable.

Instead of a blunt needle which produces an unnecessary amount of trauma of the friable kidney structure and leaves a canal through which bleeding may occur, I prefer to use a comparatively small cambric needle threaded with No. 0 chromic catgut. The suture is doubled so that the small hole made by the cambric needle will be completely filled by the two strands of catgut which follow it (c, Fig. 1). The needle is passed through the kidney structure on a plane with the cut edges of the kidney pelvis incision and repassed on the same plane in the opposite direction so as to form a loop (b, Fig. 1); the number of these sets of sutures depends upon the length of the kidney incision, but four or five are usually sufficient to hold in close and exact approximation the incised surfaces. (Fig. 2.)

The securing of these double looped sutures may be made in either of the following ways: First, the needle end of the double suture after its final emergence is passed through the double loop on the opposite kidney surface and tied to the free ends over the convex border (a, Fig. 2). Second, the needle is first cut from its doubled suture and one of these several sutures is tied as a mattress suture while its companion single suture is dealt with in the same manner as are the double sutures

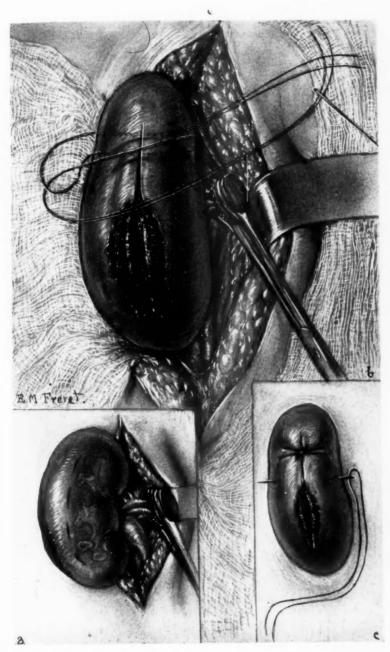


Fig. 1.—a, Shows kidney delivered, ureter and vessels freed, vessels compressed; marks on kidney surface indicate upper limits of kidney pelvis on which plane the catgut sutures are passed. b, Median longitudinal incision through traumatized area. The double suture passed through the structure of kidney, the needle end passed through double loop, and double suture tied over kidney. c, Double suture tied over kidney border; second set of sutures being passed.

in the first method (a and b, Fig. 2). The latter method is preferred if an artery of considerable size has been encountered, as hemostasis is then best secured with this mattress suture in combination with a suture passed through the loop and tied over the convex border in sufficient number to adjust the cut edges of the wound. (Fig. 3.)

Two B & B silk sutures, removable encircling sutures which insure hemostasis, are now passed completely around the kidney, one just above the upper and the other just below the lower limits of the hilum. To prevent these sutures from

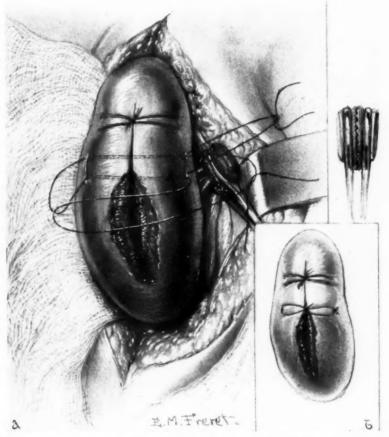


Fig. 2.—a, Second set of sutures passed; one of these sutures is being tied as a mattress suture, while its companion suture is dealt with in the same manner as the double sutures in c of the first illustration; b, shows the single mattress suture tied, and the single loop suture tied over kidney border.

losing their positions, they are made to penetrate superficially the anterior and posterior surfaces of the kidney, but only deep enough to secure an anchorage to the fibrous capsule. (Fig. 4.)

After releasing the rubber ring forceps and returning the kidney to its bed, the free ends of these sutures are made to pass through all of the tissues on one side and then on the other of the lumbar incision, and each set tied in a bow knot over a bolster of iodoform gauze. Should secondary hemorrhage occur, tightening of these sutures will insure hemostasis.

The following case is reported because its postoperative history demonstrates the value of the technic herein advocated.

Mrs. A. P., aged forty-four; height 5 feet; weight 99 pounds, entered the Woman's Hospital January 25, 1926 for the relief of vesical pain and difficulty in



Fig. 3.—Showing all the penetrating sutures in position and tied with two superficial stitches adjusting line of incision, as well as two encircling silk sutures, the free ends of which are passed through the fascia muscles after the kidney has been replaced.

voiding urine. Symptoms were of ten years duration. The urine showed albumin, many red blood cells and triple phosphate crystals. The x-ray showed a dumb-bell shaped stone in the lower pole of the left kidney. (Fig. 5.)

In the left lumbar region there existed a large depressed scar, the result of an operation done in 1913 for the removal of three stones from the left kidney. Part of the technic used then according to information received by letter of inquiry, was

the placing of a rubber drainage tube\* through the kidney structure into the kidney pelvis to insure direct drainage and irrigation of the pelvis.

Operation.—A large mass of scar tissue was found in the line of incision; great difficulty was met in freeing the kidney, especially the lower pole, because of its firm attachment to the lumbar tissues, as the result of damage inflicted at the previous operation. In order to free this pole, a considerable area of the kidney surface was necessarily severely traumatized. After delivering the kidney, the

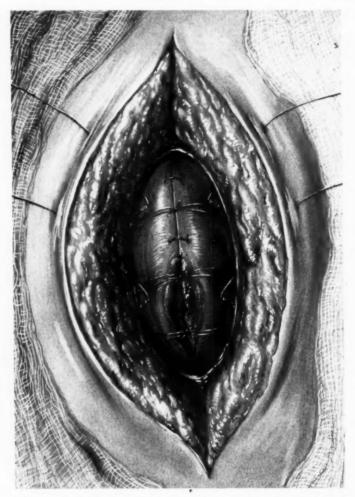


Fig. 4.—Shows free ends of encircling silk sutures passed through abdominal wall and kidney partly replaced for illustrative purpose.

renal vessels and the upper ureter were freed from their surrounding tissues to the hilum and then freed from each other. The isolated renal vessels were then grasped by a rubber ring forceps passed between the freed ureter and the vessels and a median longitudinal incision made through the kidney into the kidney pelvis, the

<sup>•</sup>This fact accounts for the difficulty encountered on reopening and as the area of direct drainage was the area of fixation and immediate postoperative bleeding, it must have also borne a causative relationship to the hemorrhage which followed several days postoperative.

stone located and extracted with light forceps and the pelvis irrigated with salt solution, gauze being previously arranged about the kidney to protect the wound.

A cambric needle large enough to accommodate No. 0 eatgut and threaded with this as a double suture, ends not tied, was made to penetrate the kidney substance on a plane parallel to the cut edges of the kidney pelvis. The needle was then re-



Fig. 5.—Showing stone in lower pole of an elevated and fixed left kidney from which three stones had been previously removed.

entered at a point less than one-half cm, from its exit and made to again penetrate the kidney on the same plane and emerge at a point about one-half cm, from its original entrance. Four of these sets of sutures were passed through the double loops on the opposite surface and tied to the free ends over the convex border. To adjust the cut edges of the kidney incision several interrupted catgut sutures were used at intervals. Two encircling removable sutures of B & B silk were used as previously described. A rubber tissue drain was placed in the region of the lower pole.

Postoperative History.—A small amount of blood was found in the urine during the first twenty-four hours after operation but none was again noted until the fifth day. This was accompanied by severe pain in the left lumbar region. Bloody urine continued four days. No bleeding was observed from the lumbar incision when dressed on the seventh day, but some was noted on the eighth day, a very considerable amount of blood was passed in the urine on the ninth day, bleeding also noted from the wound. Calcium chloride 15 gr. was given intravenously, also calcium lactate 5 gr. three times a day by mouth. Bleeding was checked for eighteen hours, seemingly as the result of this treatment; it then reoccurred in urine and lumbar wound and continued in considerable quantity for two days in spite of the continued use of calcium lactate by mouth and a second intravenous injection of calcium chloride. On the thirteenth day the small cigarette drain was completely removed and the lower B & B silk sustaining suture which encircled the lower pole was untied and retied tightly over a fresh bolster of gauze. Bleeding at once ceased and did not recur.

As the calcium salts were given a fair trial but failed to permanently check the hemorrhage and as the steadily increasing hemorrhage was immediately and permanently checked both internally and externally by tightening the B & B silk suture encircling the lower pole, the value of the removable encircling sutures under these circumstances would seem demonstrated.

Follow-up.—Patient was last seen October 22, 1926. She was relieved of all symptoms of which she complained on entering the Hospital and had gained twenty pounds. At times she has had discomfort in the region of the right kidney and along its ureteral tract. Examination showed that the right kidney had descended considerably but the left kidney was in normal position.

#### CONCLUSIONS

- 1. The removable encircling sutures can be placed without danger and their presence in no way injures the kidney structure, as is proved by the many operations for suspending the kidney I have done with success, using the removable encircling suture as here described.
- 2. These sutures should be so adjusted over a piece of gauze as to permit one or both being tightened at any time as necessity demands.
- 3. As the lower suture was not tightened until other practical means had been tried and failed, the value of the encircling suture would seem demonstrated in cases of postoperative renal hemorrhage.
  - 219 WEST SEVENTY-NINTH STREET.

### REPORT OF THREE CASES OF STRUMA OVARII

By Jesse M. Frankel, M.D., and Max Lederer, M.D., Brooklyn, N. Y. (From the Pathological Department of the Jewish Hospital)

In the routine examination of dermoid cysts of the ovary, thyroid tissue is found as one of the tissues usually encountered. It occurs more regularly, however, as the preponderant or sole constituent of a teratomatous ovarian tumor.

Gottschalk<sup>2</sup> in 1902 first reported an ovarian tumor containing hyperplastic thyroid tissue as its main component. Since then 46 cases have been added to the literature. Up to 1909, when Frank<sup>3</sup> described the first case in this country, 12 cases had been reported. In 1918 Adolph<sup>4</sup> collected 40 cases from the literature and recorded two more of his own. Since then only 5 additional cases have been described, not including the two mentioned in this paper.

Gottschalk2 named his case "folliculoma malignum ovarii," because he believed the cells to have been derived from those of the graafian follicles. Kretschmar<sup>5</sup> and Pick,6 however, recognized in this neoplasm a morphologic similarity to colloid goiter or struma. Since Pick's analysis, struma ovarii has been regarded as a teratomatous growth rather than as a metastasis from a thyroid gland, normal or abnormal. Unanimity has not yet been reached on this aspect of the matter. When in 1901 Oderfeld? found a thyroid tissue deposit in the jaw, and Steinhaus? one in the frontal bone, Kretschmar5 advanced the theory of metastasis. But Pick6 in analyzing a series of 21 dermoid cysts found thyroid tissue in 6 of them. Saxers discovered a tooth, and Meyer9 the lens of an eye, embedded in otherwise normal ovaries. Hence, Pick deduced that since single highly-specialized structures may be the only sign of a teratomatous growth, and as thyroid gland metastasizes almost always to the bones, it was not likely that the ovary would, in so many cases, be the sole seat of such a deposit. The majority of opinions has it that the other components of the teratoma are overgrown by the thyroid elements, their disappearance resulting. The occurrence of thyroid tissue growing close to respiratory anlage in such cases is not uncommon.1

As the number of cases of struma ovarii in the literature is still small, and the clinical data associated with them so sparse, the following three cases are being reported.

Case 1.—M. K., a woman fifty years of age, entered the Jewish Hospital on October 3, 1926, complaining of nausea, heartburn, epigastric postcibal distress, constipation, and loss of weight. Her family history was negative save that her father had died of gastric carcinoma. Her own previous history is irrelevant. Her menses had their onset at thirteen years, and after a normal menstrual life the menopause set in recently. She is married and has had four normal gestations and one abortion. The complaints on admission were all, except for the loss of weight, referable to the upper gastrointestinal tract, and had persisted for some time. The loss in weight was recent and slight. Apart from these symptoms, a severe left upper abdominal pain had made its appearance about two weeks before entrance to the Hospital and after lasting several days disappeared, with no recurrence.

Physical Examination.—Pulse, on admission, 84; temperature 100; respirations 20. An obese, florid female with no noteworthy features save the abdominal findings. A mass about the size of a large grapefruit was felt in the lower left abdomen, close to the midline. It was firm, ballottable, and tender. The blood pressure was 145/70. The blood count and urine examinations were normal. On opening the abdomen a quantity of scrous fluid escaped. A tumor the size of a man's fist occupied the greater part of the left ovary. The right ovary was normal. After a left oöphorectomy had been performed the abdomen was closed. Recovery was uneventful.

Macroscopic examination of the specimen revealed a solid mass 8.5 by 7 by 4 cm. to which was attached a cyst. The mass was soft in consistency, and its surface was pearly white, with no excrescences. At one point there was a ruptured cyst. On section, the capsule was found to be thick. Near one pole there was a



Fig. 1.

grayish-pink mass 2.5 cm. in diameter. The remainder was made up of soft reddish-brown tissue. This contained a core of solid material from which there was a radiating structure. Near the capsule there was a deposit of ochre-colored pigment which, on microscopic examination was found to be composed largely of typical hyperplastic thyroid tissue. The alveoli were filled with colloid and were surrounded by myxomatous tissue.

Case 2.—A. B., aged thirty-four years, entered the Jewish Hospital August 13, 1927. Her mother had died at 66 of uterine carcinoma. Her menstrual onset was at twelve years and occurs every twenty-one to twenty-four days, lasting five to six days with moderate premenstrual pain. She had been pregnant three times, one pregnancy terminating in an abortion and being complicated by phlebitis. Her complaint consisted of pain in the right lower abdominal quadrant eight days before admission, subsiding spontaneously and recurring. The pain was not accompanied by nausea or vomiting.

Physical Examination.—Pulse, on admission, 120, temperature 101, respirations 20. Only the abdominal findings presented features worthy of note. These were tenderness over McBurney's point and positive tenderness on Murphy percussion over the right side posteriorly. The urine was negative. Blood count showed 16,000 white corpuscles, of which 70 per cent were polymorphonuclear leucocytes.

At operation the appendix was found to be inflamed and were removed. At the same time an ovarian cyst on the same side was resected. The cyst measured 6 em. in diameter. Half its internal surface was grayish-white, smooth and glistening, while the other half was brownish-pink. The external surface was grayish-pink. The cyst wall was 1 mm. thick. One side of the cyst presented an encapsulated cystic nodule 1.2 by 2 cm., irregular and hard. Its section showed a grayish-yellow, glistening surface. The ovarian mass adjacent to the cyst measured 5 by 3 cm. It was soft in consistency and yellowish-pink in color. On section, its

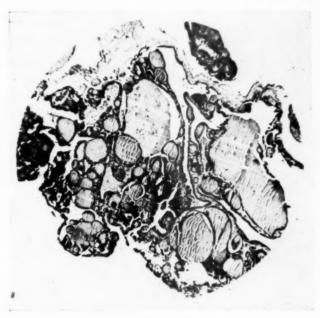


Fig. 2.

surface was rough and yellowish-gray. A corpus hemorrhagicum encountered measured 1.5 cm. in diameter. Microscopically the appearance of the characteristic areas was that of hyperplastic thyroid tissue, as in Case 1, but with the acini more markedly distended with colloid. In addition there were present other characteristics of a dermoid cyst, with which, in this case, the struma was associated; viz., skin, sweat and sebaceous glands, all lodged near the thyroid tissue.

Case 3.—B. E., aged thirty-four years, was admitted to the Hospital February 15, 1928. She complained of attacks of cramp-like pain in the right lower quadrant. Her family history was irrelevant, with the exception that of her four sisters two had been operated on for fibroids of the uterus. She was married six and one-half years and had one child, two years and ten months old. Her history states that ten weeks after her childbirth a fibroid was discovered, but it gave her no untoward symptoms. For the past year and one-half she suffered from repeated attacks of sudden pains, either cramp-like or sticking, situated usually in the right

iliac quadrant, but they were occasionally felt all over the midabdomen. The pains were frequently accompanied by nausea or vomiting. Radiation of the pain occurred occasionally toward the back, and she often had a feeling of fullness in the rectum and then defecated frequently. Some of her attacks lasted as long as ten hours. Relief was obtained by the application of heat to the abdomen.

Physical Examination.—Pulse, on admission, 102, temperature, 100.2°, respirations 30. There were no points in the examination to engage the attention, except that there was tenderness elicited on deep palpation of the abdomen to the right of the umbilicus. There was a suggestion of a mass felt below the umbilicus, but nothing definite could be made out, except that it seemed to have its origin in the right iliac fossa. On vaginal examination the cervix uteri and the corpus were essentially negative, but a tense, tender mass the size of a small grapefruit was felt arising from the pelvis and projecting into the right iliac fossa. The left



Fig. 3.

fornix was negative. A blood count showed 10,200 leucocytes, of which 56 were polymorphonuclears and 44 per cent lymphocytes; hemoglobin 85 per cent. Her blood pressure on admission was 95/65.

On operation the uterus was found to be normal in size and position, and was freely movable with several scattered fibroids. The right ovary had a multilocular cyst, twisted one and one-half times. The peritoneal cavity contained much fluid of a serous character. The appendix was atrophie, and the left ovary was cystic and had a corpus luteum. A right salpingo-oophorectomy was done. The temperature fell to normal on the second day postoperative, the respirations to 20, and the pulse to 80.

Macroscopic examination showed a mass in the parovarium 5 cm. in diameter, consisting of numerous cysts, large and small. On section, some of the cysts were found to be lined by a smooth membrane. Others had cystic projections and bone deposits. One portion showed soft brown tissue, from which a gelatinous sub-

stance could be expressed. This tissue resembled thyroid, while other areas contained sebaceous material. On microscopic examination, the main structure of the solid portion of the cyst was seen to consist of typical thyroid tissue, as shown in the microphotograph, in a state of hyperplasia.

In reviewing the literature, the clinical facts to be deduced are meager. The youngest patient reported was twenty-two years, the oldest, fifty-seven years old. Some were nulliparous, others had borne children.

The usual size of the tumor varies from that of a peach to that of a man's fist or a child's head. Ascites was present in about half of the cases. In only two cases was there a coincidental goiter of the neck. Kovács' case¹o had symptoms of exophthalmic goiter which subsided on removal of the ovarian tumor which morphologically and chemically was thyroid tissue. Kretchmar's case died of metastases, but none of the others seem to have had any complications from the neoplasm.

When the struma ovarii is part of the dermoid eyst, one will, of course, find the other characteristic structures of this genus of neoplasm, skin, hair, sebaceous and sweat glands, 11, 12, 13 brain and nerve tissue, bone, 4, 8, 14 salivary glands, 12 cartilage, 13 intestine, 2 teeth, 2 in any manner of combination of some or all of these. But the predominating picture is the thyroid tissue, which may occur in the fetal or the colloid form and in which the cyst-like acini may be enormously distended. In 11 cases thyroid tissue was the only structure present, 1, 10, 15, 16, 17, 18, 19, 20, 21 In some specimens the proliferating cells have in spots not yet assumed the characteristic thyroid structure and in some cases greatly resemble the tumors variously described as folliculomas, oöphoromas, and granulosa-cell tumors.

Rohdenburg<sup>22</sup> in classifying a series of 500 ovarian tumors encountered in the examination of 2691 ovaries, found 61 dermoid cysts and teratomas. Eighteen were pure dermoids in which thyroid tissue was encountered in 9 specimens. Accompanying a fibroma in one case there was a struma ovarii.

It has been mentioned above that several parts of our specimen in Case 1 resemble microscopically folliculoma ovarii, to which group Gottschalk assigned his tumor. Proescher and Roddy<sup>23</sup> say there is no similarity, and that Gottschalk was misled by the cystic degeneration of some of the alveoli into thinking that they arose from the follicle cells, and that the fluid in the midst of these cell groups was liquor folliculi. Often the accompanying picture is confusing. Thus Kretschmar believed his tumor to be an endothelial one, since, as Proescher and Roddy remark, "an adenomatous endothelioma, at a glance, resembles thyroid tissue."

#### REFERENCES

(1) Frank: Gynecological and Obstetrical Pathology, Appleton and Company, 1922. (2) Gottschalk: Arch. f. Gynäk., 1899, lix, 676. (3) Frank: Am. Jour. Obst., 1909, lx, 433. (4) Adolph: Arch. f. Gynäk., 1918, eviii, 657. (5) Kretschmar: Monatschr. f. Geburtsh. u. Gynäk., 1904, xix, 389, 546. (6) Pick: Berl. Med. Gesellsch., 1902, iv, 26. Berl. klin. Wchnschr., 1882, xix, 443. (7) Oderfeld and Steinhaus: Zentralbl. f. allg. Path., 1901. (8) Saxer: Beitr. z. Path. Anat., xxxi, 452. (9) Meyer: Virchow Arch., 1903. (10) Koväcs: Arch. f. Gynäk., 1924, 122:766. (11) Glockner: Zentralbl. f. Gynäk., 1903, vi, 790. (12) Lecène: Ann. de gynec. et d'obst., 1904, i, 14. (13) Walthard: Ztschr. f. Geburtsh. u. Gynäk., 1903, xlix, 233. (14) Anspach: Univ. of Penn. Med. Bull., 1903, xvi, 337. (15) Lanz: Cor. Bl. f. Schweiz. Aerzte., 1903, xxxiii, 3. (16) Polano: Ztschr. f. Geburtsh. u. Gynäk., 1904, li, 1. (17) Ribbert: Geschwulstlehre. Bonn, p. 651. (18) Eversmann: Arch. f. Gynäk., 1905, lxxvi, 101. (19) Ulesko-Stroganova: Monatschr. f. Geburtsh. u. Gynäk., 1905, xxii, 503. (20) Bell: Brit. Jour. Obst. and Gynec., 1905. (21) Swanton: Brit. Gyn. Jour., 1907, p. 244. (22) Rohdenburg: Jour. Lab. and Clin. Med., 1926, xii, 211. (23) Procecher and Roddy: Am. Jour. Obst., 1910, lxiii, 613.

# PREGNANCY FOLLOWING THE DEMONSTRATION OF THE CLOSURE OF BOTH TUBES BY HYSTEROSALPINGOGRAPHY

By M. Pierce Rucker, M.D., and L. J. Whitehead, M.D. Richmond, Virginia

IN THE January Bulletin de la Société d'obstétrique et de gyné-Cologie de Paris (xvii, 25) Mme. Francillon-Lobre and M. Dalsace report two cases in which pregnancy followed shortly after the demonstration of the patency of at least one tube by the injection of lipiodol. The authors report these cases for three reasons: (1) because no such cases have been previously reported in France, (2) because it had been argued that lipiodol might have a harmful effect upon spermatozoa and ova, (3) because both young women had exhausted all therapeutic measures both medical and surgical for sterility. In the discussion M. Douay reported a case similar to these, except that the patency of the tubes remained in doubt even after the lipiodol injection. We wish to report a case in which the tubes were demonstrated to be closed both by the Rubin test and by hysterosalpingography, and in which pregnancy followed without any treatment whatever. This case is interesting in that it shows the folly of making dogmatic statements in dealing with cases of this kind.

Mrs. M., aged thirty-five, consulted one of us on June 15, 1926. She was married in January, 1918, and had never been pregnant. She began to menstruate at 12 years, and was regular every four weeks. The flow lasted five days and was accompanied by pain the first two days. The patient had a leucorrhea of many years' duration. She had had some pain in the right side of her

abdomen since 1920. Otherwise she felt well except for a soreness in her breasts every 28 days. She gave the history of having had typhoid fever and the following operations: a nasal operation in 1916, tonsillectomy in 1920, and the insertion of a stem pessary in 1922.

The patient was five feet five inches tall and weighed 123¼ pounds. Examination was negative with the exception of a cervicitis and a basal metabolic rate of -16. The cervix was treated and she was put upon thyroid treatment. Her dysmenorrhea disappeared and in July the metabolic rate was -2. In April, 1927, the patient returned. She had continued the thyroid treatment under the direction of her home doctor for nine months. On May 5, 1927, we inflated her tubes, but no gas entered under 200 mm. of Hg. pressure. We then



Fig. 1.—Roentgenogram after injection of the uterus and tubes with iodized oil. Arrows indicate closed fimbriated extremities.

gave her 1/6 gr. of morphine and 1/150 gr. of atropine and injected the uterus with iodized oil. Both tubes filled to their fimbriated extremities, but none entered the peritoneal cavity. The patient was advised that an operation offered a good chance of relieving her condition. She planned to come back in the fall for the operation, but sickness in her husband's family and one thing and another made her put off coming back to Richmond. On February 22, 1928, she again consulted one of us, not having menstruated since October 14. There was an abdominal tumor extending from the symphysis to the navel and unmistakable fetal heart sounds and fetal movements.\*

MEDICAL ARTS BUILDING.

<sup>\*</sup>The patient was delivered of a 7% pound girl, July 18, 1928.

## PRIMARY BILATERAL CARCINOMA OF THE TUBE\*

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THE first case of carcinoma of the tube was positively demonstrated and described by Orthman in 1886. Since then the number of reported cases has increased so that in 1910, Doran could collect one hundred cases from the literature. At the present time about two hundred authentic cases are recorded. Sanger and Barth emphasize the presence of chronic inflammation as a predisposing factor in carcinoma of the tube. Doran and Fearns trace cases of carcinoma of the tube to malignant degeneration in benign papilloma. The disease generally appears in women in the fourth and fifth decade of life, although Norris has reported a case in a patient twenty-seven years of age.

Pathology.—Primary carcinoma of the tube in the majority of instances is unilateral. Bilateral cases are not infrequent, and Sanger reported three such cases in a series of twelve. Thirty per cent of all reported cases present bilateral tumors. The size of the tumor is extremely varied and ranges from a small papillary excrescence to that of a fetal head. The lateral third of the tube is the seat of choice and is accordingly dilated by the contained tumor tissue. The external tube surface is smooth or in late cases presents a network of fine papillary excrescences. On section of the tube in early cases, the mucosa is studded with numerous, fine, papillary growths. In advanced cases the tube lumen is almost completely filled with tumor tissue, but solitary masses are still recognizable. In about half the cases, the abdominal ostium is obscured due to adhesions. In some instances papillary excrescences project from the dilated abdominal ostium.

Microscopically.—These tumors universally retain the papillary type, but late cases present both papillary and alveolar formations. The pure papillary type presents a central fibrous core usually supporting only a single lining epithelial layer. In the second form the layers are frequently multiple and have lost their cell alignment. Solid alveolar clusters are reproduced and extend into the musculature of the tube. Growth accordingly is faster and more diffuse and excrescences appear externally. The component cells in both forms, are cylindrical or cuboidal in form; and are free from ciliated processes. The nuclei are large, vesicular but irregularly located and present marked variation in size, form, and staining capacity.

<sup>\*</sup>Read before the Brooklyn Gynecological Society, April, 1928.

Complications.—The purely papillary form generally is circumscribed and remains in the lumen of the tube but may produce metastasis by the lymphatic or vascular channels. The papillo-alveolar form in addition penetrates the tube to reach the peritoneal coat resulting in malignant implantation throughout the peritoneal cavity. In both types metastasis to the ovary, uterus, and retroperitoneal glands occurs. Stultz encountered seven cases of lymph node metastasis in forty-three reported cases. The following case report will illustrate the clinical and pathologic features of bilateral carcinoma of the tube.

Mrs. M. K., aged fifty-six, was admitted to the Medical service of Dr. Luther F. Warren, December 5, 1927, complaining of vaginal discharge, pain and swelling in the abdomen, and loss of weight. Family history was irrelevant. Previous medical history was essentially negative except for pyelitis at the age of twenty-eight. At the age of twenty a fibroid tumor was removed. Menstruation began at the age of fifteen, recurred every twenty-eight days and lasted for three to four



Fig. 1.—Right Tube: The organ has been sectioned to expose the interior. The ampullar and infundibular portions of the tube present papillary excrescences and tuberous tumor masses. Tumor tissue can be traced to the isthmic zone.

days. Menopause occurred at the age of forty-six. Patient was first married at the age of eighteen, husband died four years later of diabetes. The patient remarried at the age of forty-eight; husband died three years later of pulmonary tuberculosis. Patient had one child with the first husband thirty-four years ago; pregnancy, labor, and puerperium were normal.

Present Illness.—A vaginal discharge was first noticed by the patient two years ago which was moderate in amount, markedly foul, and pale pink in coloration. Four weeks prior to admission it spontaneously disappeared. At this time enlargement of the abdomen was first noticed. This has been progressive, particularly marked in the lower abdomen, and associated with pain in the right side radiating to the right lumbar region. The pain was burning in type and intermittent in character. It was not related to meals and not relieved by medication. Since onset, the patient has been incapacitated due to a feeling of weakness. Her weight has progressively diminished from 147 pounds, one year ago, to 125 pounds at the time of admission to hospital.

Physical Examination.—Patient had a general anemia. Head, neck, and thorax were essentially negative. Abdomen was markedly distended, dullness present in the flanks; a fluid wave was elicited. The liver was palpable. Pelvic examination

revealed a marital introitus. Anterior and posterior vaginal walls normal. Cervix was small, lacterated and slightly limited in motion. The uterus as such could not be sharply defined because of the marked abdominal distension. An irregular mass was present in the right lateral fornix. Laboratory data: Red blood cells 4,250,000, Hb. 70 per cent, white blood count 7,000, neutrophiles 68 per cent, blood pressure 140/50, urine normal, blood chemistry normal, blood Wassermann four-plus. In spite of abdominal paracentesis and general supportive treatment the patient gradually failed and died on January 3, 1928.

Autopsy was performed January 4, 1928, by Dr. J. Arnold de Veer. "The body is that of an elderly female greatly emaciated. The peritoneal cavity contains about a liter of serofibrinous blood-stained fluid. Both pleural cavities contain a small amount of clear fluid. The lungs are free from exudate and are edematous posteriorly but otherwise normal; there is no exudate in the pericardial cavity. There are no pericardial adhesions. The heart is normal in size. The

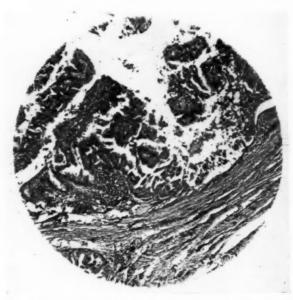


Fig. 2.—Microscopic section of right tube: The papillary excrescences grossly noted are presented by papillary carcinoma. Note the multiple cell layers. The musculature is edematous, (x80.)

musculature is firm. The aorta is markedly atheromatous. The aortic cusps are widely separated at the commissures. The remaining valves are normal. All of the abdominal viscera are covered by recent fibrinous adhesions. The spleen is normal in size and consistency. On section it shows moderate fibrosis. The liver is large, pale and softer than normal. On section it presents congestion and fatty degeneration. The gall bladder contains a solitary gallstone measuring 1.5 by 2.5 cm. The capsules of the kidneys strip readily but leaves coarsely granular cortex. They are normal in size and the markings are fairly well preserved. Gastrointestinal tract presents no special changes. The omentum extends down into the pelvis and is filled with metastatic nodules of carcinoma. The sigmoid is surrounded by carcinoma but its luteum is free from involvement."

The pelvic viscera were removed en masse and referred to the gynecologic laboratory for examination. Uterus: The organ is most densely covered with papillary malignant tissue which covers the anterior and fundal portions of the organ; posteriorly the serosa is smooth and shiny. The organ measures 7 cm. in length from fundus to external os, 5 cm. transversely at the level of the round ligaments and 2 cm. in the anteroposterior diameter. The squamous lining of the portio is normal. The os is patent. On incision the uterine cavity is regular. The endocervical mucosa is atrophic but several of the arborae vitae are retained. The lining of the body and fundus is smooth and atrophic. The myometrium is thin, atrophic and fibrous and measures 10 mm. in the cervical area, 8 mm. in the body and fundus. The vessels in the vascular zone are sclerotic. The serosa has been largely replaced by tumor tissue previously noted. Extension into the underlying muscle however is not distinctly recognizable on gross examination. Microscopically: The endometrium presents typical senile atrophy. The myometrium is comprised of small muscle fasiculi comprised of atrophic muscle fibers. The connective tissue septa are prominent. These changes are dependent upon sclerosis

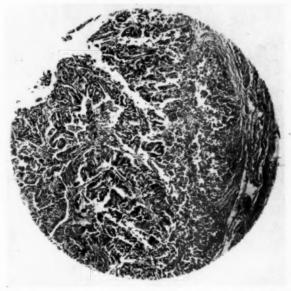


Fig. 3.—Left tube: The papillary form of carcinoma is largely effaced. Alveolar and adenocarcinoma are reproduced. Invasion into the tubal musculature is definitely shown. (x120.)

of the medium and small arterioles. The serosa is thickened, congested and has been largely replaced by implants of carcinoma. These reproduce long, slender folds with prominent secondary arborization. The histology of the cell is essentially as noted below in the description of the tubes. In other segments in the uterine wall invasion of the outer muscle fasiculi has occurred. Alveolar and glandular carcinoma is reproduced.

Right Tube.—Has been converted into a typical retort structure measuring 14 cm. long, 4 mm. transversely through the uterine junction and 50 mm. transversely through the dilated ampullar portion. The serous coat is smooth, though an occasional adhesion is encountered. Focally small irregular greyish nodules are encountered varying from 4 to 8 mm. in size. These are subserous in their location. On incision the lumen of the tube is dilated and in the outer portion filled with yellow inspissated material. After its removal the mucosa of the tube is well

shown. It is covered with numerous fine papillary processes which represent earcinoma. Where dilatation is less prominent the tube lumen is compactly filled with this tumor tissue occurring in broad tuberous masses or in fine papillary folds. The neoplastic process extends practically to the isthmic portion of the tube. Invasion into the muscle is focally noted and these areas correspond to the yellow plaques noted on the exterior of the organ. The parametrium is focally infiltrated. Microscopically: The lumen is filled with necrotic tumor debris. The mucosa has been converted into long, slender papillary masses with prominent branching. Centrally these contain a slender core of fibrous tissue and congested capillaries. The lining is comprised of 6 to 8 cell layers though many retain a solitary lining layer. The cell outline is poorly shown, the cytoplasm is scant; the nuclei oval and vesicular in type. Variation in size and stain are constantly noted. The muscle is edematous and atrophic; the serosa is similarly congested.

Right Ovary.—Is markedly atrophic, almond-shaped and measures 20 by 8 by 6 mm. The tunica is thickened and sclerotic; corrugation is marked. Surface implantation of the tumor tissue is lacking. On incision sclerosis is marked and diffuse. Small yellow granules studded through the organ suggest metastasis from the tube. Microscopically: The surface is clothed with adhesions. The cortex and medulla present diffuse sclerosis. Alveoli of necrotic metastatic tumor deposits are noted in the medulla. The pattern reproduced is that of adenocarcinoma.

Left Tube.—The organ has been traumatized on removal rendering its gross description somewhat difficult. It measures after reconstruction 80 mm. long, 4 mm. transversely at the uterine end and 5 mm. transversely in the ampullar zone. The uterine and isthmic portions are densely covered with surface papillary masses as noted over the uterus. The remainder is covered with adhesions. The abdominal ostium as such is not recognizable. On incision the lumen is found dilated but collapsed due to trauma thus distorting the size. The mucosa is largely replaced by fine papillary masses found in all segments. Extension into the muscle is frequently noted. In the isthmic portion the lumen is dilated and replaced by compact tumor tissue, which is sharply defined from the wall of the organ. Microscopically: The lumen is obliterated. This is the result of fusion of papillary excrescences on opposing walls. The general features are essentially as described in the right tube, but irregular alveoli of tumor cells infiltrate the muscle coat reaching the serosa.

The left ovary which was grossly recognizable is fused with the tube and broad ligament. It measures 20 by 18 by 8 mm. Surface is corrugated. On section it presents diffuse sclerosis. Microscopically it is free from metastases.

Diagnosis.—Senile involution of uterus; carcinomatous implants; bilateral papillary adenocarcinoma of the tubes; metastatic carcinoma of right ovary; secondary peritoneal carcinomatosis.

Thanks are hereby extended to Dr. Luther F. Warren for permission to report this ease and to Mr. James V. Dunn for the excellent photographs.

#### REFERENCE

Veit, J.: Handbuch der Gynäkologie, v. 193.

1530 PRESIDENT STREET.

# THE TREATMENT OF ASPHYXIA NEONATORUM BY THE INJECTION OF ALPHA-LOBELINE INTO THE UMBILICAL VEIN\*

#### A PRELIMINARY REPORT

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ALPHA-LOBELINE is more or less familiar and used in many of our large hospitals, although reports of its efficacy are conflicting. There are two principal reasons for this; one, a lack of proper indications, and the other, that it has often been used intramuscularly when only intravenous introduction could possibly have been of much use. A large number of cases, carefully controlled and scientifically observed, is necessary before the medical profession can know the status of this drug. This has not yet been done.

The principal alkaloid of the plant is lobeline, which, until recently, had only been isolated in the form of amorphous salts. These salts exhibited to a great degree the property of producing emesis, and this was considered their principal action. Because of the difficulty of obtaining them chemically pure and of regulating the dosage, they were seldom used for this purpose, however.

In 1916, Wieland, in Germany, succeeded in preparing a pure, crystalline, hydrochloric salt, and it is this preparation which was used in the cases herein reported. It differs markedly from the previous amorphous preparations, in that it does not cause vomiting.

I believe that the experimental pharmacologic evidence that alphalobeline is a respiratory stimulant is convincing and refer to the appended bibliography.

The action of alpha-lobeline on the blood pressure, heart muscle, and pulse is not marked, but it has been shown to have a favorable action on the circulation, even though it can hardly be considered a heart stimulant.

Opinions rarely agree on the treatment of asphyxia neonatorum. Broadly speaking, fetal asphyxia is due to two distinct causes:

a. Actual injury to the respiratory center during delivery, with encroaching intracranial hemorrhage.

b. Respiratory center depressants and poisons.

Under the latter heading come morphine and other drugs; prolonged

<sup>\*</sup>Read at a meeting of the Brooklyn Gynecological Society, February 3, 1928, and of the section on Obstetrics and Gynecology of the New York Academy of Medicine, February 28, 1928.

anesthesia, resulting in the presence in the baby's blood of large quantities of ether, chloroform, etc.; and, lastly, CO<sub>2</sub>. When present in proper quantity, CO<sub>2</sub> is a respiratory stimulant, but an excess quantity first depresses and finally paralyzes the respiratory center. If the asphyxia is due to CO<sub>2</sub>, we may combat it by artificial respiration. If additional poisons such as ether, chloroform, and particularly morphine are present, there is then a double burden on the center. The need in such a case is for a direct respiratory stimulant in order to raise the threshold of response to a point where the center can again function itself. This we have in alpha-lobeline, providing that it can be quickly brought in sufficient concentration to the center. Because of the poor circulation usually present in asphyxiated babies, the drug must be exhibited intravenously. Slow, doubtful, or negative results from the use of this drug have principally been due to failure or to poor absorption from intramuscular or subcutaneous injections.

In those cases in which the respiratory center has been extensively damaged by trauma, little can be expected from alpha-lobeline or any other measure, although in several instances following its use, irregular, spasmodic respirations were obtained, but not long sustained. Autopsy in these cases always disclosed serious damage to the center.

The intravenous effect of the drug lasts from ten to twenty minutes, but this, as a rule, is amply sufficient. Subsequent intramuscular injections, in view of the improved circulation, will then suffice to carry on for a longer time the desired stimulation if it is still needed. Quick action on the center can be obtained only by intravenous injection.

It is convenient to divide the treatment of asphyxia neonatorum as follows:

- a. Cases in which the center is severely traumatized and nothing is of any avail.
- b. Cases of moderate asphyxia in which the center is not too severely depressed and which, after clearing the throat of mucus, respond to any or all of the simple methods, such as flagellation, the alternate application of heat and cold, etc. These cases respond because a stimulus is carried to a center still susceptible to stimulation. In the last analysis, however, these methods only hasten respiration, for it has been fairly conclusively shown that a child who responds in this way will breathe spontaneously if left alone, although considerable time may clapse before it does so.
- e. Cases of grave asphyxia, with a center so markedly poisoned and depressed that the aforementioned methods are of no avail. If a response to these methods is not obtained in a reasonable length of time, they should certainly not be persisted in. Violent maneuvers, often frantically performed, have killed many babies and are never indicated.

For the past two years, alpha-lobeline has been employed in the Methodist Episcopal Hospital in the treatment of asphyxia neonatorum, but until recently only by the intramuscular route. Used only in severe cases and in conjunction with other methods, it was difficult to get a true idea of its value. In spite of this there was an impression among members of the staff that it was helpful. Following its injection, the babies appeared to respond more readily to the usual stimulative methods and particularly to artificial respiration. Because of this, it was always kept available for instant use.

After hearing of some excellent results in adults following the intravenous use of alpha-lobeline in the treatment of morphine poisoning, we felt strongly that if it was to be of real help in our birth asphyxias, it undoubtedly ought to be employed in the same manner to determine its clinical efficiency and usefulness. It was first necessary, therefore, to find a portal of entry into the blood stream which would be rapid, safe, and could be generally employed. After considering direct implantation into the heart chamber, also the use of the longitudinal sinus, and discarding them as too dangerous, except as a last resort, the umbilical vein evidently offered the best means of access to the blood stream for this or any other drug.

A careful search of the literature fails to reveal that alpha-lobeline has been employed in this manner before, and we believe this to be largely the reason for the uncertain results often obtained. Leibowitch, of Moscow, in 1925, discussed the resuscitation of the asphyxiated newborn by means of the intraumbilical injection of physiologic salt-adrenalin solution. He stated that he was unable to draw conclusions from the small number of eases observed, but recommended its trial in those cases in which there was no prospect of success with other methods. I realize that before definite conclusions can be drawn a large number of cases are necessary. At the present time we are keeping in the hospital a careful record of each case with the following data: (a) the type of labor and delivery, (b) period of gestation, (e) medication employed, (d) anesthetic used, (e) type and degree of asphyxia, (f) preliminary stimulation of child, if any, (g) heart rate when born, (h) time and dose of alpha-lobeline, (i) number of seconds elapsing following its injection to the first respiration, (j) the character of the succeeding respirations and the heart rate, (k) the later course of the child.

This preliminary report is presented in order to draw attention to the use of this drug in the manner to be described and to suggest its use in cases of grave asphyxia, especially if other methods have failed. Its employment requires little skill and it is hoped that the results which may be obtained will be reported as soon as possible.

#### TECHNIC OF INJECTION

The infant dose of alpha-lobeline is 1/20 of a grain. In our maternity service, a sterile ampoule of the drug and a sterile syringe are kept on the delivery table and if it is feared that the baby is asphyxiated, the syringe is filled with the drug before the birth in order that valuable time may not be lost.

If injection is determined upon, an assistant holds the baby by the feet with the head down. The operator grasps the umbilical cord with one hand and, picking a favorable site, the needle, with its point directed toward the baby, is



Fig. 1.—Showing injection of alpha-lobeline in the umbilical vein of an asphyxiated infant.

inserted at an angle of 45 degrees into the umbilical vein. When the needle is felt to be in the lumen, the piston of the syringe is slightly withdrawn in order to verify this. If blood appears in the syringe, the alpha-lobeline is injected, the needle withdrawn, and a finger placed for a short time over the wound.

If the following points are kept in mind the identification of the umbilical vein is easy:

- 1. The umbilical vein is larger than either individual artery.
- 2. Both arteries run a more or less spiral course around the cord while the umbilical vein takes a more direct one.

3. The umbilical vein usually discloses points of dilation and varicosity and this in conjunction with its greater size will identify it in most cases.

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4. The most important point is the fact that the vein does not pulsate and the arteries do. This can be easily detected by placing the tip of one finger lightly against the vessel wall. The pulsations are distinct and easily palpable when the arteries are touched but are not felt when the vein is palpated. If this be borne in mind, there ought to be no difficulty in identifying the vessels. If such a difficulty should arise, it is best to inject all three, using 1/3 of the ampoule for each, as this quantity has been found sufficient to produce a reaction after the umbilical vein has been entered.

The point has been raised that the cord pulsations might have ceased. If this were so, the baby would be dead, for pulsations continue in the umbilical arteries, although often very faintly, until respirations commence or the heart stops. With the expansion of the lungs at the time of the first respiratory movements, definite changes occur in the



Fig. 2.—Showing a favorable site for injection. Note the blood in the syringe which proves the needle has entered the lumen. U.A., uterine artery; U.V., uterine veins.

fetal circulation and the cord pulsations actually do cease, but as the baby is now able to breathe spontaneously alpha-lobeline is no longer needed intravenously. We can sum up by saying that until the advent of respirations, the umbilical portal of entry is always open, after which, this portal is no longer needed. The vein should not be pierced too near the abdomen of the child, to avoid the presence of a puncture wound between the cord tie and the baby. Any point in the cord distal to where it will be tied may be used although we prefer one about six inches from its insertion, providing the umbilical vein is adaptable for puncture at this point. If the cord has been clamped and cut during or after delivery, the technic is the same, except that, following the withdrawal of the needle, the blood in the vein should be milked into the infant. This is done by compressing the cord near the clamp between two fingers and sliding these fingers along the cord, thus pushing

its contained blood into the baby. This gives results practically as good as if the cord had not been clamped.

#### CASE REPORTS

We have used alpha-lobeline in the manner described, thirty-five times in the maternity service of the Methodist Episcopal Hospital. As this is a preliminary report only, no attempt will be made to analyze these cases. Only a few can be eited.

Case 1.—A. P., aged twenty-four, para i, was admitted March 25, 1927. She had a spontaneous delivery of a full-term, 7 pound 15 ounce child, following a seventeen and one-half hour labor. Morphine, gr. ¼, six hours previous to delivery and morphine, gr. ½, with scopolamine, gr. ½<sub>150</sub>, four hours before delivery, had been given. The baby showed evidence of deep asphyxia and failed to respond to the usual methods of resuscitation. Seven minutes after delivery one ampoule of alpha-lobeline was injected into the umbilical vein; the baby commenced to breathe exactly fifteen seconds later, and its course from that time was uneventful. This was the first time that alpha-lobeline was used in the umbilical vein and the effect was striking.

Case 2.—C. McC., aged twenty-seven, para i, was admitted August 23, 1927. She was one week past term and had had a negative pregnancy until one week before delivery, when a marked rise in blood pressure, and the appearance of albumin in the urine warned of trouble. Labor commenced spontaneously, but during its course a severe convulsion occurred which was followed in the next eight hours by two more. The patient was given morphine, gr. 1/3, and chloral, gr. 10, and following a difficult forceps delivery under deep ether anesthesia, the baby was deeply asphyxiated (asphyxia pallida). During the next five minutes it failed to respond to all treatment, including mouth to mouth insufflation, and, as the heart had practically stopped, its condition appeared desperate. One ampule of alpha-lobeline was injected into the umbilical vein and in twelve seconds an initial respiration occurred. This was at once followed by marked continuous respiratory movements, quickly reaching a maximum and then gradually subsiding, reaching normal about ten minutes later. The color quickly improved, no aftereffects were noted, and baby and mother left the hospital on the thirteenth day, in good condition.

Case 3.—M. C., aged twenty-four, para i, was admitted March 27, 1927, with negative history and physical findings, but with a threatening premature labor. In order to prevent, if possible, further labor, chloral, gr. 10, and sodium bromide, gr. 40, were given by mouth and morphine, gr. ¼, by hypodermic. Despite this medication the patient gave birth five hours later to a premature infant, weighing only 2 pounds 9 ounces. A faint cardiac impulse was discernible, but the condition of this baby appeared hopeless. It hung flaccid and was almost black in color. One ampoule of alpha-lobeline was injected into the vein without difficulty, although the cord was very small. Respirations commenced within a few seconds, the baby improved and remained in fair condition for a few hours, but became eyanotic and died five hours later, apparently of prematurity. No autopsy was obtained.

Case 4.—J. S., aged twenty-five, para i, was admitted May 1, 1927, two weeks past term. This patient had a long, difficult, nineteen and one-half hour labor which had to be terminated by a difficult forceps operation under ether anesthesia; the baby weighed 10 pounds 3½ ounces. Morphine, gr. ¼, had been administered

seven hours before delivery and morphine, gr. ½, two hours previous to delivery. The baby presented a typical picture of asphyxia pallida and would not respond to efforts of resuscitation including artificial respiration. The cardiac impulse was almost imperceptible, and as fourteen minutes had clapsed following delivery, without further delay one ampoule of alpha-lobeline was injected into the vein. Ten seconds later, respiratory movements similar to those described in Case 2 commenced. The baby's condition instantly improved and from that time onward it ran an uneventful course.

Case 5.—E. B., aged twenty-two, para i, was admitted July 14, 1927, with a severe pyelitis. When three weeks from term she spontaneously went into labor and was delivered of a premature 4 pounds 14 ounce baby. Its condition was poor and despite our efforts it refused to breathe. One ampoule of alpha-lobeline was injected into the vein ten minutes after delivery, and the baby responded in seven seconds. It did well from that time onward.

Case 6.—1. C., aged twenty-nine, para ii, entered November 4, 1927. After nine and one-quarter hours' labor she was delivered by forceps, under ether anesthesia, of an eight pound baby which was moderately asphyxiated. For five minutes it refused to breathe and although the heart action and general condition were good, one ampoule of alpha-lobeline was injected. In exactly seven seconds the baby commenced to breathe vigorously in the manner characteristic of alpha-lobeline stimulation.

Case 7.—A. P., aged thirty-eight, para i, entered November 17, 1927. Her blood pressure was 200/120, she was very toxic and completely blind. There was also marked tenderness over the liver and a jaundiced skin. Although only seven months pregnant, she was delivered under ether anesthesia a few hours later by a classic cesarean section because of the urgency of her symptoms. Morphine sulphate, gr. ¼, had been given four hours before operation. The baby weighed 3 pounds, was pallid and refused to breathe, although every effort was used to make it do so. After five minutes had clapsed, and the cardiac impulse being then almost imperceptible, one ampoule of alpha-lobeline was injected. In seven seconds an initial respiration occurred which was quickly followed by others. The heartbeat returned, the color improved and the child was soon out of immediate danger. The result in this case was dramatic, it being the feeling of all present that the infant was undoubtedly saved by the alpha-lobeline. At this date, January 10, mother and child are doing well.

Case 8.—M. S., aged twenty-eight, para iii, entered February 9, 1928. She had a history of two instrumental stillbirths, and expressed a keen desire for a living child. The history was otherwise negative. Pelvic measurements indicated a generally contracted, flat pelvis. A classic cesarean section, under local anesthesia, was done because of the large size of the baby (8 pounds 4 ounces), the contracted pelvis, and failure to progress after seventeen hours of labor. One hour before operation scopolamine, gr. ½50, and morphine sulphate, gr. ½6, were given. Thirty minutes later this medication was repeated.

Upon opening the uterus, the cavity was found to be filled with meconium-stained fluid, and the baby, when extracted, was limp and very white. It was first treated conservatively by aspiration of mucus and flagellation, but as the heart-beat was slow and faint, artificial respiration was resorted to. Despite these measures the child became worse, and although every effort had been made to resuscitate it without the use of alpha-lobeline, the condition was now so bad, the cardiac impulse so slow and faint, and the child so near death that alpha-

lobeline was used as a last resort. Sixteen minutes following delivery, one ampoule of alpha-lobeline was injected. Twelve seconds later, although only seven seconds after the milking of the blood from the cord, which had been previously clamped, an initial respiration occurred. Others quickly followed, and in a few minutes the baby was in excellent condition and has done well since.

#### DISCUSSION

The outstanding feature, when alpha-lobeline is used in the manner described, is the rapidity of its action. The primary respiration occurs from seven to fifteen seconds following injection, undoubtedly depending to some extent upon the efficiency of the circulation. In cases in which the cord is clamped and it is necessary to milk the blood into the baby, the reaction is slower but does not take more than twenty seconds. Little difference has been noted with smaller doses of alphalobeline or when the degree of asphyxia varies widely. The early respiratory movements are different from those usually seen in an asphyxiated child. They are full and rapid from the beginning and cause an almost instantaneous disappearance of cyanosis. The babies rarely cry for some little time, apparently because of the rapidity of the respirations. These respiratory movements gradually subside, however, and in fifteen minutes or less the breathing appears normal.

It would be well to now consider the safety of alpha-lobeline. Mennet, in 1925, reported marked reactions following its use in asphyxia neonatorum, thus confirming reports of spasms and tetany made by other authors. Lang, in 1926, and Pfeilsticker in 1927, also spoke of these reactions. Both these authors, however, felt that the untoward effects were due to impurities or faulty manufacture rather than to the drug itself. Mennet, writing again in 1926, stated that he believed complications were due to an impure product and that, if the purity of the drug were guaranteed, there would be no danger in its use and that, in combating asphyxia, excellent results could be expected.

Whatever the cause of the reactions reported, in our own work with the drug no after effects have yet been observed. The babies are not spastic, do not vomit, and appear the same as babies which have not been subjected to this treatment. We have not had a sufficient number of cases to give a final answer to this question, but feel so far that no harm will follow its use providing that due regard to asepsis be given at the time of injection.

Some writers claim that an early complete expansion of the lungs is desirable to prevent certain types of atelectasis. Because of this I feel that alpha-lobeline can be used to advantage even in those babies which would eventually breathe spontaneously, but are slow to do so because of the presence of morphine, excess CO<sub>2</sub>, etc.

The injection of alpha-lobeline directly into the heart has been recommended, but this is dangerous and never indicated unless the umbilical method has failed, and the baby is apparently dead. If so used, it should be preceded by an injection of adrenalin.

#### CONCLUSIONS

- 1. It is recommended that alpha-lobeline be injected into the umbilical vein for the treatment of asphyxia neonatorum, the dose being from 1/40 to 1/20 of a grain.
- 2. The umbilical vein is easy to identify and enter, but in ease of doubt all three vessels may be injected to insure the presence of the drug in the vein. The vein is always available for injection until respirations commence.
- 3. The clinical results have so far been encouraging; the initial respiration occurring from seven to twenty seconds after injection, and the action of the drug lasting from ten to twenty minutes.

#### REFERENCES

(1) Randall: Am. Med. Bot., 1817, i, 183. (2) Mattson: Am. Vegetable Practice, 1841. (3) Lewis, Wm. H. D.: Am. Jour. Pharm., 1878, vii, 154. (4) Von Rosen, H.: Am. Jour. Pharm., 1886, xvi, 224. (5) Dreser, H.: Arch. f. exper. Path. u. Pharmakol., 1889, xxvi, 237. (6) Wieland, H.: Arch. f. exper. Path. and Therapie, 1916, lxxix, 95. (7) Eckstein, Rominger, and Wieland: Ztschr. f. Kinderheilk., 1921, xxviii, 208. (8) Overbeck, August: Med. Jour. and Rec., July 1, 1925, exxii, 40. (9) Behrens, B., and Pulewka, P.: Klin. Wchnschr., 37; 3, jg. (10) Bonsmann, N. R.: Klin. Wchnschr., 1924, p. 2127. (11) v. Miltner, Theodor: Monatschr. f. Geburtsh. u. Gynäk., 1923, Heft 62. (12) Hellwig, Alexander: Zentralbl. f. Chir., 1921, p. 731. (13) Grill, W.: Klin. Wchnschr., 1924, p. 46. (14) Peters, Kurt: Med. Jour. a. Rec., March 18, 1925. (15) Gwathmey, James T.: Jour. Am. Med. Assn., August, 1921, p. 77. (16) Wieland, H., and Meyer, R.: Arch. f. Path. u. Pharmakol., 1922, xlii, 195. (17) Nielsen, G.: Proceedings of the Oklahoma Academy of Science, 1926, lviii. (18) Mennet: Zentralbl. f. Gynäk., 1925, p. 2703. (19) Mennet: Zentralbl f. Gynäk., 1926, p. 1522. (20) Lang: Zentralbl. f. Gynäk., 1926, p. 1527. (22) Leibowitch, J. (Moscow): Med. Klin., 1925, xxi, 131.

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## THE FEMALE SEX HORMONE. IX. POSSIBLE SIGNIFICANCE OF THE RODENT VAGINAL SPREAD REACTION IN THE MALE BLOOD

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IN NUMEROUS previous publications we have demonstrated the presence and distribution of the female sex hormone in the circulating blood. 1. 2. 3. 4 This method has proved of use in clinical diagnosis and in the purposeful planning of therapy. 5. 6 The presence of the active substance has been demonstrated by means of the mouse

vaginal spread as introduced by Stockard and Papanicalou, Long and Evans, and Allen and Doisy.

Recently investigators have shown a positive reaction to the rodent vaginal smear in the urine and even in the blood of males. 10, 11, 12 In a preliminary paper on the significance of the female sex hormone reaction in the male blood 13 we have published the results obtained on 60 bloods from 47 male patients in which 40 showed a negative reaction, 3 showed a threshold reaction, and 4 showed doubtful, weak reaction. These males were of all ages, extending from nineteen to fifty-five years, and of the married ones, 3 had had several children. Our results obtained on the urines of twelve men were uniformly negative, although huge quantities were used for extraction and injected into the test mice.

These results do not in any way modify or impair the results obtained on females, including even the attempts at determining sex, 14 because in the female a cyclical reaction, that is the regular reappearance of a positive test at a comparatively fixed interval (say twenty-one to twenty-eight days), can only be explained by ovarian action. The interpretation of a positive finding in the male is of the greatest theoretic as well as practical interest.

In our preliminary paper<sup>13</sup> we said that these findings may be variously interpreted. (1) The vaginal spread reaction may not be specific. (2) The male and female sex hormone may produce the same reaction on the castrate rodent employed for the test. (3) Certain males, though apparently normal, may be latent hermaphrodites, possessing an ovotestis and, therefore, able to produce sufficient female sex hormone to appear in the blood. Anatomically such individuals have actually been described, the findings being either confirmed at operation or at postmortem.<sup>15</sup> An attempt has been made further to elucidate this question by means of experiments. These experiments may be divided into three groups.

The first group consisted of the injection of huge amounts of testicular extracts into castrated rats and mice. These experiments extended over the last five years. 16 Fresh bull testicles were finely minced, sometimes also rubbed up with sand, and subjected to extraction with saline solution, decinormal hydrochloric acid, decinormal sodium hydrate, plain water, alcoholic extractions, ethereal extractions, and the resultant extracts injected over longer or shorter periods. In no case was the slightest indication of a positive result obtained by the vaginal spread reaction.

A second set of experiments was based upon work published by Carminati<sup>17</sup> in which this author claimed to have obtained positive results by taking fresh rat testicles and injecting a 1 to 5 saline suspension into castrated female rats. We repeated this work exactly according to the directions of the author with negative results, and

thereafter ran several other sets of experiments in which we used much larger dosage, a daily freshly made extract, and continued the injections over double the period mentioned by this investigator, with negative results throughout.

Finally, we injected rats with a lipoid extract prepared by one of us (McGee), according to a method similar to that published by Frank and Gustavson<sup>18</sup> for their extraction of ovary and placenta; these extracts having been tested out on capons, according to the method previously published<sup>19, 20</sup> in which animals they had produced well marked increase of combs, wattles and ear lobes. Large quantities of these extracts injected into female castrate rats over a considerable period of time, with variations of quantity and time, so as to produce the optimum results, were likewise negative.

From these negative results obtained from all testicular extracts thus far tried by us, we feel justified in believing (1) that the rodent vaginal spread test appears specific for the female sex hormone; (2) that testicular extracts do not give a positive rodent vaginal smear reaction; (3) that a positive reaction obtained occasionally in a male is as yet unexplained. We are at present attempting to investigate whether this occasional find might offer a physical basis for homosexuality.

#### REFERENCES

(1) Frank, R. T., Frank, M. L., Gustavson, R. G., and Weyerts, W. W.: Jour. Am. Med. Assn., August 15, 1925, lxxxv, 510. (2) Frank R. T., and Goldberger, M. A.: Jour. Am. Med. Assn., May 29, 1926, lxxxvi, 1686. (3) Frank, R. T., and Goldberger, M. A.: Jour. Am. Med. Assn., November 20, 1926, lxxxvii, 1719. (4) Frank, R. T., and Goldberger, M. A.: Jour. Am. Med. Assn., February, 1928, xe, 376. (5) Frank, R. T., and Goldberger, M. A.: Jour. Am. Med. Assn., January 14, 1928, xe, 106. (6) Frank, R. T., and Goldberger, M. A.: New York State Jour. Med. (to be published). (7) Stockard, C. R., and Papanicolaou, G. N.: Am. Jour. Anat., Philadelphia, 1917, xxii, 225. (8) Long, J. A., and Evans, H. M.: Memoirs of the Univ. of Cal., vi. (9) Allen, E., and Doisy, E. A.: Jour. Am. Med. Assn., 1923, lxxxi, 819. (10) Dohrn, M.: Klin. Wehnsehr, 1927, vi, 359. (11) Hirseh: Klin. Wehnsehr, 1928, vii, 313. (12) Aschheim, B.: Arch. f. Gynäk, 1927, cxxxii, 179. (13) Frank, R. T., and Goldberger, M. A.: Proc. Soc. Exper. Biol. and Med., 1928, xxv, 476. (14) Frank, R. T., and Goldberger, M. A.: Proc. Soc. Exper. Biol. and Med., 1928, xxv, 476. (14) Frank, R. T., and Goldberger, M. A.: Gynec. et Obst., 1920, i, 273. (16) Frank, R. T., Gustavson, R. G., et alia: Endocrinology, May-June, 1926, x, 260. (17) Carminati, V.: Endocrinol. epatol. costituz, 1927, ii, 337. (18) Frank, R. T., and Gustavson, R. G.: Jour. Am. Med. Assn., June 6, 1925, lxxxiv, 1715. (19) McGee, L. C.: Proc. Inst. Med. of Chicago, April 22, 1927. (20) McGee, L. C.: Dissertation, Univ. of Chicago.

### THE RIGID AND STENOSED CERVIX IN THE FIRST STAGE OF LABOR\*

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IN A PREVIOUS paper,† we have discussed the rôle of the various factors causing scarring with resultant cervical rigidity. In the following paper we will give reasons for our belief that true primary cervical dystocia is practically always due to fibrosis, in spite of appearances and opinions to the contrary. We will consider the diagnosis and treatment of this and allied conditions complicating the first stage of labor.

#### ETIOLOGY AND PATHOLOGY

The normal cervix contains proportionately more connective tissue intermixed with its smooth muscle and elastic fiber than does the body of the uterus. The racimose nature of the glands of the cervix, its exposed situation, and its frequent subjection to trauma and bacterial invasion make it the common seat of chronic infection. chemic, and bacterial irritation keep up a slow smouldering destruction of the specialized muscle and elastic fibers, which are replaced by the faster growing, hardier, but nonexpansile scar tissue cells. All other things being equal, the ability of the cervix to dilate is directly proportionate to the amount of muscle and elastic tissue elements as compared to the fibrous tissue content. The arrangement of the scar fibers. however, is important. They contract or shrink with time, and do not again relax. If their arrangement is circular, their action simulates sphineteric closure. If they are irregularly disposed, they may cause distortions, knobs or bands, interfering with the orderly dilatation of the parturient canal. We believe that this substitution process, due to whatsoever cause, is present in practically every true rigidity or stenosis of the cervix.

Following the literature back to the middle of the 19th century, we find that the classifications of dystocia include a "spasmodic or functional" type of rigidity of the cervix (Taurin, Viguier, and others).

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<sup>†</sup>Am. Jour. Obst. and Gynec., August, 1928, xvi, 258.

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The use of the word functional in this regard seems to us a paradox, for the physiologic "function" of the cervical musculature in labor (i.e., its normal action) is to dilate the cervical canal. As Sturmdorf says, "Cervical dilatation becomes an integral part of uterine contractions."

The presence of a muscular mechanism to accomplish dilatation (longitudinal and oblique layers) has been quite well established; but there is considerable controversy in regard to the existence of a definite circular layer which might accomplish active closure. It is thought by many that tonus during pregnancy is maintained by such a circular layer, and that the loss of its integrity, as in deep lateral tears, facilitates abortion or miscarriage by permitting gaping. During labor, according to this theory, the dilating mechanism dominates, the circular fibers being reflexly inhibited. This conception seems to have its origin in an hypothetic similarity between the physiology of the cervix and that of various sphincters rather than on clearly established anatomic and physiologic grounds. Rational as it may seem, it does not account for the countless full-term pregnancies and normal labors which occur in the presence of vicious cervical distortions, or following radical amputation of the cervix. Sturmdorf and others flatly deny the existence of any continuous circular layer of cervical musculature, and maintain that the fibers are "disposed in a serried succession of oblique circle segments \* \* \* which widen the os like an iris diaphragm of a microscope." We must admit that in general, results of studies of the cervical musculature do not leave a clear cut impression of finality. However, it is our interpretation that the normal caliber at all times is maintained by the anatomic conformation of the part, as in other nonsphineteric orifices, rather than by a mechanism of specialized continuous circular fibers.

In view of the mass of conflicting opinion we submit: (1) that the actual existence of an active contractile mechanism is not established; (2) that even those who claim the existence of such a mechanism assign to it a negative function during labor; and (3) that the element of scar or diffuse fibrosis is present with an uniformity which explains the majority of the so-called anatomically or spasmodically rigid cervices. We must admit with Ehrenfest, that occasionally, clinically, we are confronted with a case of apparent primary cervical dystocia which seems to present a problem of abnormal cervical innervation, but in a careful study of this type of case as reported in the complete literature the lack of conclusive anatomic and pathologic background for such an hypothesis is striking.

The etiology of the so-called functional or spasmodic nondilatability is most often ascribed to fault in either the nervous or neuromuscular mechanism of coordination. The concensus of opinion in regard to the anatomic relation of the cervical muscle to that of the corpus

is that the important connection is through the middle layer, which is more in continuity with the muscle of the corpus than any other layer and would logically fulfill the function of a coordinating conduction system similar to that of the Purkinge fibers of the heart. It seems reasonable to suppose that this continuity might be important in the control of rhythmic contractions of the uterus in labor, and that its disruption might cause a cervical dystocia due to incoordination, a sort of uterine "bundle block." There is evidence for such a theory. yet we have seen a sufficient number of normal labors following distortions or radical amputation of the cervix (see also Rawls, Audebert. Pozzi, etc.) to convince us that the integrity of such a mechanism is not an absolute essential to the normal sequence of labor. We think it more likely that the fibers which dilate and "take up" the cervix during labor are hampered by the presence of inert connective tissue cells, and must act at unusual and disadvantageous angles; in other words, that the interference is with the mechanical efficiency of the muscle rather than with an hypothetic conduction system.

The following ease seen in consultation by one of us is illustrative:

Case Report (Dr. Albert Holman).—Mrs. S., St. Vincent's Hospital. The patient was a primipara, forty-three years old, at term. Induction was attempted and the patient had indefinite and irregular pains, described as pseudolabor, for seventy-two hours, following which she had fourteen hours of severe but more or less irregular labor pains, increasing in severity but without notable effect either in descent of the presenting part or in thinning or dilatation of the cervix. There was breech presentation and numerous small fibroids were notable on the fundus, prior to delivery. Morphine-scopolamine was used liberally throughout the four days. After consultation, cesarean section was determined upon because of (1) prolonged ineffectual contractions, (2) advanced age, (3) primiparity, (4) fibroids, and (5) breech presentation.

Cesarean section was performed and was uneventful. The baby survived and convalescence was without serious event. The operative report states that the uterus contained approximately 15 small fibroids varying in size from an almond to a walnut.

In this case we feel that the replacement of smooth muscle and elastic fiber by nonexpansile fibrous tissue, hampered the normal action of the remaining muscle of both cervix and corpus and that the distortion caused the fibers to act from unfavorable angles and ineffectually.

We do not believe that there is a nervous or neuromuscular mechanism of coordination between cervix and fundus, indispensable to the successful dilatation of the cervix in labor. If there is such a mechanism, it is not of a sort to be incapacitated by gross anatomic alteration of the tissues involved (amputation of the cervix, trachelorrhaphy), or by paralysis of the local innervation (spinal block) or injury to the great cervical ganglia lying lateral to the cervix.\* The insidious

<sup>\*</sup>These ganglia are normally about one-half inch in diameter, but during pregnancy increase to as much as two inches. They extend very low and are involved in all extensive lateral tears.

invasion by fibrosis together with the extreme frequency with which it is encountered leads us to believe in the great likelihood of the fibrosis as the cause of such cervical dystocia, rather than in a delicate and poorly defined mechanical balance between corpus and cervix.

There is a definite parallel between the occurrence of fibrosis and cervical dystocia with uterine inertia in the case of elderly primiparae. The relation is one of cause and effect. Nor are the congenital cases exempt from this category for even where there seems never to have been a cervical canal, there is found an increase of fibrous tissue. Nagel conducted studies from which he deduced that in the embryo there might be friction between the lower ends of the Mullerian tubes, with resultant irritation and sear tissue formation, obstructing a part of the opening formed by the later fusion of these two conduits. Such an abnormality would be present at birth and followed in some cases by an ulceration due to the contact of the two lips, with searring and resultant stenosis or atresia.

Baudeloque and his school (Wallich, Bouffe de St. Blaise, Doleris. Barnes, etc.) denied the existence of complete atresias of the cervix, and believed that the majority of cervical dystocias were functional, and not due to tissue change. Only a part of the material on which their conclusions are based is available, but the cases of Wallich and Bouffe de St. Blaise are indicative. They examined microscopic sections of pieces of tissue in such cases, which had been brought away by the head, or occasionally by the forceps. They found no gross tissue change, except a marked edema. They deduce from this that there was no original pathology in the cervix. In the first place, there might have been sclerosis elsewhere in the cervix. In the second place, we submit that this finding together with the clinical picture suggests definitely the type of case in which a prolapsed cervical lip (usually anterior becomes pinched and enormously edematous, and may retard labor indefinitely until it is slipped back, or incised, or, as seems to have been the case here, carried away by the presenting part. We have analyzed the observations of this group (Wallich, Bouffe de St. Blaise) because they constitute the best organized attempt to establish as a clinical entity a true spasmodic or functional rigidity of the cervix. Their presentation is not convincing.\*

The above group of cases shows a suggestive similarity to a type of dystocia which we have encountered clinically and have not as yet found clearly described. We refer to cases in which the head fits into the inlet, often quite deeply, but always very tightly, so that it is difficult to move it digitally, either from below or above. Passage of the

<sup>\*</sup>Quite recently our attention has been called to a case reported by Greenhill (Jour. Am. Med. Assn., 1922, lxxviii, 98) in which there appeared to be an active contraction of the cervix about one thigh of the child during a cephalic delivery. There was an enormous edema of the part thought due to pressure by the cervix. If such was the case, we must accept it as very difficult to explain. The case is unique.

head through the inlet is very slow and the cervix remains thick, dilatation not progressing, though the contractions may become very forceful indeed. There is a tendency to feel that the bony disproportion is not responsible for the failure of the cervix to take up and dilate in these cases, since often, after a long hard labor, the head is found to pass successfully. The relative bony disproportion is, of course, important, and we believe that the circumferential pressure of the tight head against the pelvic brim and walls mechanically compresses the tissue of the lower uterine segment and inhibits the upward migration of the muscle fibers of the cervical walls. The taking up of the cervix is effectually checked; edema is induced by pressure on the vessels and the result is a thick undilated cervix in an otherwise well advanced labor. It would be easy to ascribe this failure to dilate primarily to the cervix, especially if the head is later delivered without serious mishap. If portions of the cervix were carried away in such cases, pathologic examination of the tissue, as in the cases of Wallich (etc.) would not reveal fibrotic changes, yet the cervix might seem the apparent cause of the dystocia. In a case recently published by Lee Dorset, the fetus was stillborn following the sloughing of a complete collar of cervix. The fact that there was a generally contracted pelvis indicates that the accident was unavoidable and that the cervix was not a primary factor in the dystocia. It illustrates, however, an extreme degree of the mechanism to which we refer. Confusion in regard to the rôle of the cervix in this type of dystocia is more apt to occur where the pelvic measurements are normal, but the head large and highly calcified.

An active functional contraction of the cervix late in the second stage is mentioned by several authors (DeLee, Viguier, and others). This is said to occur especially in breech extractions, and is described as a tightening of the cervix about the neck of the child. We have seen conditions suggestive of such an occurrence but feel that the mechanism is of apparent rather than actual contraction. The fact that it is reported during breech extraction in every case is significant. The diameters of the breech and trunk being less than those of the head, there is a natural tendency for arrest of the head at the cervix. Moreover, with insufficient dilatation, extension of the head is apt to occur. The arrest will naturally occur with the cervix about the neck, and if the cervix has been stretched by traction from below or pressure from above (pituitrin) to allow the passage of the trunk, it will tend to resume its actual circumference about the neck exactly as it does between pains over an advancing vertex. Thus, the apparent active contraction is seen to be rather a function of the normal elasticity of the cervix plus the obvious disproportion between the diameters of the canal and those of the more or less extended head. During two deliveries, one of a microcephalic, and the other of an anencephalic, one of the authors noted the cervix apparently contracted about the neck of the fetus. The contraction was, of course, apparent rather than real, and due to the reversed disproportion between the sizes of the head and shoulders. We have not found reported a case in which such an apparent contraction occurred in the course of a vertex delivery of a normal infant.

A few authors (Tonef and others) feel that they are not infrequently able to distinguish the presence of a true spasmodic rigidity of the cervix early in labor. The theoretic and clinical background for such a diagnosis is, to say the least, obscure, and the diagnosis seems to have been made rather by inference and in view of preconceived ideas than upon tangible clinical data. In practice, the effort should be made to determine a sounder basis. Even if the dystocia can be shown clearly to be primarily in the cervix, and if both history and examination reveal the absence of data pointing to fibrosis, it is still not necessary to fall back upon an hypothetic "spasmodic cervical contraction" as the dystocic factor.

Ehrenfest has wisely called our attention to the apparent constitutional and psychic similarity between women who present most often this unexplained delayed cervical dilatation, and those who suffer severely from true dysmenorrheic pain: "in girls exhibiting the stigmas of underdevelopment-which so often is found associated with genital hypoplasia-in women with noticeable impairment of mental nervous balance, or again in those in whom a disturbed endocrine harmony is evidenced by somatic features often approaching male characteristics" (etc.). We are at present engaged in a detailed study of this relationship, the results of which we will report later. At present, we feel that such a concept should be carried clearly in mind in attempting to judge the actual stage of the labor by the apparent severity of the patient's suffering or by the relative mental and physical fatigue. We can expect a subconscious exaggeration of the early pain of onsetting labor from the type of woman who translates in consciousness the ordinary menstrual uterine contraction as exquisite pain.

First, we must realize that the major criterion of the period of labor (the cervix not progressing) is the patient's subjective report and our observation of the apparent severity of the pains. The degree of the uterine contraction as noted bimanually may be of value, but we have often felt prolonged firm contractions long before the onset of actual labor, and poor transient contractions with complete dilatation. We do not agree with Tonef that it is a simple matter for the trained observer to palpate an obstinate cervix and determine with ease the presence of "spasmodic rigidity." After all, the appearance and outery of the patient are our chief index where the cervix does not progress normally. An exaggerated susceptibility to pain is too often

misconstrued and we find reported two- or three-day labors without progress, which, if carefully analyzed and treated with the exercise of the proper psychology, would prove to be merely the preparatory stage which is often calmly described to us by women of less suggestible mental habitus.

We have in mind a timid, youthful patient, very much frightened by the terrible prospect of her first childbirth, who, without our knowledge, was placed in the labor room with a multipara well advanced in labor. To our surprise we were called by the nurse to deliver this patient after a very few hours in the hospital. We found the patient in a delivery room adjoining that occupied by her former roommate with doors open between, and both women apparently in the agonies of the final pains of expulsion. Examination revealed that our patient had apparently not even begun labor as far as actual progress was concerned. She was taken to a quiet room, given a sedative and reassured as to her condition. She very soon fell asleep, and the following day went through a complete and perfectly uneventful labor.

It is this course of events which we believe is most frequently mistaken for a spasmodic nondilatability of the cervix. There are two factors contributing to confuse us: first, our inability to judge accurately, in the absence of normal cervical changes, the advance of other phases of the labor; and second, the degree of voluntary muscular resistance to descent which may be exerted by patients who fear acutely the pains incident to active cervical dilatation. This second factor is important also, and we believe that descent and dilatation can be effectively retarded by such a mechanism. We wish, however, to distinguish clearly between this general voluntary resistance and an hypothetic spasm of the cervical musculature which is innervated through the vegetative nervous system, and not under conscious control.

A word in regard to the extreme value of morphine and other worth while sedatives should perhaps be said here. The efficiency of such treatment in this type of case seems to us proof of the general as opposed to the local nature of the underlying cause, for such sedation has no specific local effect whatsoever. In contrast, we find little to support the specificity of belladonna or its derivatives in such cases. Theoretically, there should follow a relaxation similar to that seen in the iris or the gastrointestinal tract, were there an actual anatomic similarity. It is impossible, then, to absolutely deny the existence of a "spasmodic nondilatility" of the cervix in labor, but it seems that such cases of cervical dystocia as cannot be clearly shown due to fibrosis or scarring are best explained as due to other factors than "spasm."

Where there is no disproportion and no demonstrable cervical fibrosis, failure of the cervix to dilate may be due to displacement of the os. Frequently, this condition is also due to distortion from fibrosis tissue contraction. Occasionally, however, there seems to be a marked posterior displacement of the cervical canal which cannot thus be ac-

counted for. The cervical lips may lap one over the other, thus effacing the canal. More often the posterior overlies the anterior (T. C. Smith). The failure to dilate in such cases is due to the disadvantage at which the contents of the lower uterine segment must work as a dilator. A similar ineffective dilating mechanism is seen in eases of faulty presentation, where, because of its shape, the presenting part is ill adapted as a dilator. DeLee, Henderson, and others, believe that adhesions between unruptured membranes and the cervical walls, caused by endocervical inflammation, are not infrequent impediments to labor. Pressure by cervical tumors such as fibroids or polyps may determine a dystocia not primarily fibrous in nature, and, of course, in cancer, the rigidity due to the epithelial proliferation will interfere with dilatation. The rôle of caustics, cautery, and operation has been discussed in a previous paper.

Authors differ widely in regard to the frequency of the occurrence of syphilis of the cervix. The important injury is by the third stage lesion (Taurin) which causes a notable induration, or granulomatous overgrowth, and leaves an extensive scar. Doleris from an analysis of 15 cases believes the chancre to be the important lesion. Gellhorn points out that the induration in both chancre and gumma is greatly increased during pregnancy and may be the cause of marked cervical dystocia. Tuberculous ulcers, actinomycosis, or other special diseases of the cervix destroy specialized tissue and leave scars. The pin-point os or the occlusion of the senile cervix is only a function of the fibrotic tendency, plus the prolonged effect of imperfect drainage and the inroads of ever present infection in the cervical glands. A consideration of the mechanism by which these various conditions exert their action on the cervix serves to fix more strongly in our minds the uniformity with which fibrosis occurs as the basic pathology.

Practically all authorities (with the exception of Klob) agree that stricture or occlusion at the internal os is not as frequent as in the outer half of the canal. The most frequent site is the external os, as most of the injurious processes do not extend deeply along the canal. The tissue of the region of the internal os is retracted into the lower uterine segment during labor, and for this reason is seldom involved in the ordinary obstetric tear. The majority of cervical operations affect only the lower portion of the canal, and even caustic applications and cautery are not often carried to the internal os. Contracture of the internal os has been seen following curettement, and was a frequent sequel to the endometrial application of eaustics such as zinc chloride. We believe that a not uncommon cause of scarring high in the cervical canal is the unskillful use of mechanical dilators. In untrained hands, these instruments may be not completely inserted, and the blades separated short of the internal os, with consequent tearing of the tissue in the upper half of the canal.

Where there is an actual fibrous obliteration of the entire canal or of any considerable part of it, the condition is invariably the result of rather complete denudation of the epithelium, whether due to disease or to trauma or to necrosis consequent on a circular scar which, in healing, exerts a slow sphincteric action of closure. In such a case, pregnancy is not apt to occur and the cervix will be of a fibrous consistency, often nodular and irregular, and frequently almost the consistency of cartilage. It is notable, however, that pregnancy may occur through the most viciously deformed cervices. This type of sclerosis has been seen in collar-like rings of cervix carried away during labor (Tyler Smith). Cazeau described an occlusive cervical membrane as being "aponeurotic in nature" and so resistant that no moderate force could lacerate or break it. Mesnard speaks of a cervix so tough that it actually could not be cut with seissors and Coutade described the consistence of a cervix as "sclerotic, dry and woody." We would refer also to reports of cervices so rigid as to cause a deep pressure groove, or actual necrotic ring on the scalp of the fetus.

We are interested in the condition early noted and first elucidated by Mattei in 1862, called "conglutinatio orificii externi," in which there could be ascribed no definite cause for the localized occlusion. He cites 19 such cases, and attempts to explain them on the basis of a fibrous organization of the static mucous plug in the cervix of pregnancy. Various modified conceptions of the theory have been held, but more recently, the condition is less often described, and the tendency is toward the idea that the basic factor is either disease or trauma, however mild. Kiwisch and others thought that the occlusion might be the function of a sort of cervical decidual reaction "representing an agglutinating layer, which afterward, when the canal is distended, is increased into a membrane of varying density." Lusk, Mme. de la Chappelle, J. Schmitt, and others believe that the cervical stasis associated with pregnancy is an important factor, and Virchow points to an allied condition of occlusion due to senile atrophy following cessation of the menses. The friable nature of this membrane, and its almost gummy consistency in some instances, are the reasons advanced by the older writers for believing that they were dealing simply with a toughened and tenacious plug of cervical mucus.

We have noted in several cases of our own, where there was failure to dilate, that the external os remained undilated due to a thin wiry ring of indistensable tissue at the precise region of the external os. Pressure by the finger or the tiniest of incisions serves to free such an obstruction. No doubt, there is a similarity between this condition and that described above, the difference being that in the latter case the external os is more widely open, and agglutination of the devitalized lips cannot take place. Schroeder believed that most of the cases thought to be completely occluded were of this type, with an external opening so fine as not to be discernable. Williams is inclined to agree with Schroeder in regard to the so-called "conglutination," yet mentions two cases of his own in which there was a "complete atresia" at the external os, and in which the histories presented no evidence of previous injury or disease.

#### DIAGNOSIS

Diagnosis of Complete Occlusion.—In the majority of cases of stenosis or occlusion occurring in the course of pregnancy, there will be no

variation in the normal course of events. The existence of the pregnancy establishes the fact that there must have been a patent canal through which the sperm might pass, but impregnation has been reported where there was sufficient occlusion to cause suppression of menses. Frequently, the history is not suggestive and even a careful digital examination may fail to establish the diagnosis of pathology which is not at the external os. In cases in which the history is at all suggestive, digital and specular examination should be made. The semi-prone or knee-chest position may be helpful to differentiate deviations or simply distortions of the canal. In complete occlusions, the absence of cervical mucus (dryness of vagina) is an important, though not constant sign. The presence of irregularities, distortions, and scarring will be suggestive. The diagnosis is less easy before the onset of labor. When labor has commenced, if the contraction is at the external os, as it is in most cases, the cervix will thin out and be more or less normally effaced, but dilatation will not occur. As a rule the presenting part will bulge into the thinned cervix and the region of the stenosed occluded cervical canal will be rather easily found due to the presence of localized thickening or irregularity often with a crater-like dimple. The cervix may become so thin as to be mistaken for the membranes of the fetal scalp. In some cases there may be absolutely no indication of the presence of a cervical canal. In such a case, a misplacement or deviation of the canal should always be considered and the greatest care used to exclude such a possibility. If the constriction is in the upper half of the canal, effacement will not occur even with the labor otherwise well advanced. The relaxed lower portion of the canal, however, will invariably permit the passage of a finger to the region of the occlusion and the diagnosis is seldom difficult. This type of occlusion, moreover, is as a rule, due to pathology which may be suspected from the history.

Diagnosis of Stricture or Partial Occlusion.—It may be difficult to distinguish between a complete occlusion of the cervix and a stenosis with only a minute opening or very small distorted canal; but it will be less difficult to determine the presence of stenosis in cases where a certain amount of dilatation has occurred. The history together with the traces of subsequent injury and disease should elucidate the presence of a causative fibrotic process. It must be remembered, however, that the absence of distortion or marked induration cannot be taken to exclude a diffuse fibrosis. As a matter of fact, the fibrosis dependent upon chronic endocervical infection, and that due to the insidious invasion by connective tissue (as in elderly primiparae) may deviate from the normal only in the exhibition of a moderate increase in density on palpation. Confusion may arise through the presence of conditions allied to the so-called "conglutination" of the lips (see page 398) or in the presence of a fine circumferential fibrous ring (see

page 398). It is not always easy to determine clearly the unique cervical origin of the dystocia. Beside clearly defined cervical dystocia, we have considered here only those conditions which simulated more or less closely such a condition. It is necessary of course to have at command a thorough knowledge of all types of dystocia, and to leave no stone unturned in the effort to climinate all possible extra cervical contributory factors.

Again the history is important. Possible trauma (childbirth, operation, caustics, cautery, etc.) or disease (neisserian infection, persistent leucorrhea) or a history suggestive of indurative changes (premature or actual senile changes) of the sort seen in elderly primiparae, must be considered. Examination should be both visual and tactile and under aseptic precautions. It is unnecessary to describe again in detail the findings indicative of fibrosis, varying from gross distortion of the lips with extreme rigidity through lesser degrees of scarring and induration. Edema may be present to mask an underlying induration, but often is an indication of bony disproportion as well (see page 393). We will not pause to go into further detail for the literature is replete with description of the pathology which may be encountered.

We are convinced that the great majority of cases of primary cervical dystocia present the element of fibrosis as a cause or contributing factor. Occasionally, however, we note a delayed first stage in which history and findings seem to eliminate such an etiologic factor. There are three alternatives: first, that the delay is apparent rather than real and that the impression of retarded dilatation and effacement is due to exaggeration by the patient of the premonitory stages of labor; second, that the patient, through fear of pain consequent upon cervical pressure, is exerting a more or less voluntary resistance to descent; and third, that there may be an active spasmodic contraction of the cervix opposing dilatation. It will be possible to educe definite data to establish the first and second of the above mentioned alternatives by a study of the patient during her pregnancy and beginning labor, but we are not cognizant of factors which would determine a clinical diagnosis of spasmodic primary rigidity of the cervix. The reports (Tonef and others) of this type of rigidity present nothing tangible to elucidate such a diagnosis. The value of belladonna is far from proved, and certainly not sufficient to contribute toward the clinical evidence of the existence of a "spasmodic rigidity." The favorable effect of morphine in assisting dilatation is to be trusted only as evidence to exclude the presence of serious fibrous rigidity and points toward the likelihood of the existence of one of the first two above named general psychic factors. Its action is general and not local. By its use we treat the patient and not the cervix. As it is almost constantly used together with belladonna in the reported cases of "spasmodic rigidity," we ascribe the favorable effects noted due

to the general relaxing and analgesic effects of the morphine, and do not believe that the vaunted efficacy of the belladonna has contributed to substantiate the diagnosis of "spasmodic rigidity."

#### TREATMENT

Prophylaxis.—Nothing can be done to forestall the so-called congenital cervical atresias. An early knowledge of the condition, however, may help to avert serious later consequences both medically and socially. To this end, careful examination of those who show delayed menarche or notable dysmenorrhea is advised. The occurrence of vulvovaginitis, especially if the case has been neglected, should stimulate careful supervision during puberty. It is probable that many of the so-called congenital stenoses or atresias originate in a fetal or infantile inflammation of the cervical canal or lower ends of the Mullerian tubes. Vaginal atresias are frequently due to an early vaginitis. These sequellae do not occur where the vulvovaginitis or cervicitis is given the requisite attention (Taussig, Schauffler). The fact that such a condition has been treated, however, does not exclude the possibility of later stenosis or atresia. Unfortunately, too drastic treatment may increase rather than diminish the chances of subsequent scar tissue contracture.

Much of this paper is devoted to an exposition of the causal relation between measures intended to cure the ills of the cervix uteri and subsequent resultant stricture and occlusion. We reach the heart of the matter when we admit with Pinard that the treatment has too often been worse (in its late results) than the original disease. The reason for an apparent shortsightedness in this regard lies in a failure to understand or to admit the intrinsic nature of sear tissue. Incisions and cauterized areas may seem, even after many weeks, to have healed quite to the liking of the operator. It is only after months or years that the insidious contracture of the scar fibers makes itself apparent. Since it is difficult to follow the average case over a long period, we must accept the judgment of those who have been able to do this, and leave a wide margin of safety. Operation must be exact, and the probability of subsequent infection must be minimized. We must remember that curettage may cause scarring, especially in the region of the internal os, and that any type of rapid dilatation may cause tears with subsequent stenosis. The use of caustics should be strictly limited. Linear cautery should be used conservatively, and the picture of resultant scar contraction kept constantly in mind. Obstetric tears of the cervix should be repaired at once, but the sutures should be tied loosely to prevent pressure necrosis and in order not to hamper involution. Needless to say, all measures should be taken for the avoidance of tears. In this regard we need only stress the frequent warnings in regard to precipitate labors, "bearing down" on an undilated cervix, high forceps, faulty application, manual or instrumental dilation, careless use of pituitrin, premature or ill-timed interference in breech presentations, and any form of "accouchement forcé." An important but frequently overlooked point in the prophylaxis of cervical tears is the control of precipitate labors. To this end, the intelligent use of induction at term, as outlined by Mathieu is of value. The method is almost universally successful in the case of multiparae calculated to be at term, and precludes the danger of precipitate labor at home or on the way to the hospital. The patient is always under hospital observation and anesthesia available to control very severe contractions. The ideal prophylaxis will consist not in the exclusion of procedures which might, with correct indications, be of value, but in the constant exercise of judgment in regard to the probable subsequent scar. The margin of safety must be large.

#### TREATMENT IN LABOR

General Measures.—Since we attach little significance to such classifications as "spasmodie" or "functional" cervical resistance, we may seem inconsistent in dwelling on methods of treatment which do not have as their object a definite attack on some actual resistance due to fibrosis or sear rigidity. We will admit that the use of general measures is directed only toward the production of analgesia, and a general relaxation and resting of the patient. For example, there is no local action of morphine or of rectal ether in oil upon the cervix, yet we frequently see an astonishing progress in dilatation consequent upon their use. We advise the use of such measures because they are uniformly helpful clinically, and because, even in cases of true rigidity, they may exert a generally favorable influence.

Expectancy is in itself a most important factor in the treatment of these cases; but it must be tempered by a thorough knowledge of the dangers of procrastination. The physical condition and temperament of the patient, the relation between the amount of outery and the severity of the contractions as judged by manual or bimanual examination, the condition of the fetus; these and other factors must be weighed against the failure of the cervix to dilate, in the determination of whether or not to intercede. The mental attitude of the patient, or of the patient's family must not be seriously considered as against the evidence of actual examination. We wish to condemn the practice of urging the patient to bear down before complete dilatation is accomplished, especially with primiparae. It may be necessary to exert considerable authority to prevent overzealous nurses or interns from urging this practice. It is pernicious and may actually defeat its own purpose if it does not cause other serious damage. The use of morphine, more often than not, accelerates the course of dilatation but it should not be employed until the labor is definitely in progress.

Also the effect on the baby should be taken into account. We have noted the most favorable effects in delayed dilatation following the use of morphine and magnesium sulphate followed by rectal ether and oil as advised by Gwathmey and Davis. Analgesia by nitrous oxide or ethylene is superior to that obtained by ether inhalations, but is hardly practicable in cases where the first stage is greatly prolonged. Chloroform should not be used in this way. Chloral hydrate, magnesium sulphate and other hypnotics by themselves are seldom of definite value. The use of atropine hypodermatically in doses of 1/100 gr. has its champions. (Ady, King.) Ady states that "it will as certainly dilate the os as it will the iris." King states that "its action occurs within twenty minutes and is to be relied upon." The use of belladonna both by mouth and locally to the cervix is a maxim of all the early writers and was recently advised by Tonef. Actually, however, we find few instances in the literature in which its value seems clear.

Hot Douches and Bath.—We mention the use of hot douches only to condemn them. They are scarcely more rational or safe than the much abused intrauterine douche of the last century. Both were widely used in an effort to assist dilatation of the cervix. A word, however, in regard to the complete hot bath should be said here. We were early impressed by the efficacy of this procedure as used by Cornell at the Chicago Lying-In Hospital. Where there is a strong nervous element especially with hysterical tendency, together with great fatigue, a half to an hour of immersion in warm water is of the greatest assistance in relaxing and quieting the patient. This effect is accentuated if the patient is under morphine. It is important to keep the thighs tightly crossed to exclude water from the vagina. We believe that this time honored measure should be used more often than it is.

Bleeding.—This procedure has been advocated since earliest times (La Chappelle, Mauriceau, Ashwell, etc.), from 10 to 30 ounces being withdrawn subsequent to labor. The favorable effect on a stubborn cervix seems to be analogous to the general relaxing effect of narcotics and sedatives, or the hot bath. Were it not for the efficacy of other methods in the treatment of cervical rigidity, and our inability to calculate how much the additional blood loss at delivery would be, we might still find a definite place for bleeding in our treatment.

Bags.—An attempt is frequently made to overcome cervical rigidity by the introduction of a conical bag and the use of weights. The mechanism of this procedure is unnatural and it seldom achieves the desired result. Furthermore, there is the added danger of infection and the increased tendency toward prolapse of the cord and later descensus due to the dragging down by the weights. That it is dangerous is attested by its mortality. We advise against its use in cases of true cervical rigidity. The following case is only one of many in which failure resulted in loss of time and a definitely less favorable prognosis.\*

Confinement Case 47650 New York Lying-In Hospital, Service of Dr. Kosmak. The patient entered at 11 p.m., December 1, 1920, with the history of escape of fluid, absence of fetal movements for past two days and weak contractions every 15 to 20 minutes. At admission there proved to be a breech presentation with no

 $<sup>^{\</sup>circ}\text{This}$  and subsequent case reports from the New York Lying-In Hospital are used through the courtesy of Dr. Asa B. Davis.

engagement. Fetal movements could not be felt nor the fetal heart tones heard. Position Right Sacro Anterior. Hard mass size of fist in left flank, suggestive of fibroid. Vaginal examination revealed cervix closed. Pelvis of medium size. There was marked rectocele. Cervix appeared to have been site of plastic operation (three years before). There was a firm ring of sear tissue with a small opening which admitted only a finger tip but could not be forced open by the finger. Pains increased to every three to five minutes lasting ten to fifteen seconds. Quarter grain of morphine was given at 11:30 p.m. The contractions gradually became more severe but at 4 p.m. on the following day (fifteen hours of active labor) there was no progress and the cervix remained unchanged.

Former History.—Patient was a para vi, having had two miscarriages, the first and third deliveries instrumental, the second a breech extraction. Previous pregnancy 3 years before resulted in a miscarriage. First labor fourteen years before. Operation three years before, nature not clear.

Operation (by Dr. McDonald under direction of Dr. Kosmak).—Patient in lithotomy position. Lips of cervix seized with tenacula but could not be brought down to vulva. Clamp inserted into cervix and the sear tissue ring dilated by opening the clamp. Several small incisions then made in cervix and dilatation to 2 fingers, thus obtained. No. 4 bag inserted and patient sent back to bed. At 9:30 p.m. (five hours later) there was no further dilatation of cervix despite strong pains with bag in place. Bag removed and radical bilateral incisions then made in cervix. Considerable foul smelling fluid escaped. One foot seized and breech extraction done slowly. Living baby. Placenta expressed easily. Uterus and vagina packed with iodoform gauze. Cervical incision only oozing. No sutures taken. Perineum intact.

Recovery was uneventful. Examination twelve days after labor showed perineum markedly relaxed with large rectocele. Cervical wound granulating, fairly clean crater. Cervical opening into vaginal vault one inch in diameter. The internal os, however, was closed. The fundus suggested the presence of fibroids.

We feel that the use of the bag in this case did not materially assist dilatation, but was a waste of valuable time, and increased the possibility of dangerous complications.

Incisions.—This procedure has been used to our knowledge since 1788 (Lauverjat). Dührssen (in 1890) advocated and popularized the use of several (generally three) incisions, and his name is at present used in this connection. Audebert is a well-known recent advocate. To justify the use of incisions in labor, it must have been clearly determined that the primary dystocia is in the cervix and that more dilatation is necessary than can be secured by a reasonable amount of stretching or that early delivery is essential regardless of the condition of the dilatation. With care, a moderate degree of dilatation may be obtained manually. The method of Harris is preferable. The use of mechanical dilators should not be undertaken. Quoting DeLee's textbook (page 965), "Most so-called manual and instrumental dilatations of the cervix are in reality bilateral incisions or tears, but made with blunt instruments." To this end, it is wiser, if further dilatation is required, to make several incisions, whose total relaxing effect will allow free passage of the uterine contents. The danger of

incising the cervix prior to effacement has been pointed out since the earliest use of the operation. Extension is to be feared and hemorrhage is more likely to occur, due to nonretraction of cervical vessels. Audebert and Rascol are not impressed by these dangers, but for the majority, effacement is an absolute essential to the safe and successful use of incisions. It is our practice to make "Dührssen's" incisions as advised by DeLee (at points 2, 6 and 10 corresponding to the clock face), estimating the depth necessary to allow passage of the head, but generally to the vaginal fornix. We have never encountered serious bleeding, have had no alarming extensions, and have generally been able to judge correctly the depth of incision necessary. The use of sponge forceps to draw down the lips will minimize trauma and assist in the performance of the operation under vision. The tension in the region of the incisions should be noted digitally as far as possible during extraction or spontaneous delivery.

Vaginal cesarean section as described by Dührssen may be the operation of choice, where effacement has not taken place. It is in all respects a major surgical procedure, and increasingly so as the duration of the pregnancy approaches term. The technic of the operation will not be discussed here. Care must be taken to allow room for the passage of the uterine contents. A posterior incision should always be made if there is any question of sufficient dilatation. Hemorrhage may be a serious complication, but as a rule, mid-line incisions will involve the less vascular areas.

Any incision should be carefully sutured, but the sutures tied lightly. Postpartum examination in these cases should be thorough, and the patient should be kept under observation as long as possible. There is always additional danger of cervical dystocia in subsequent labors, due to the initial pathology plus the contractile effect of the healed incisions. If incision is necessary to effect dilatation in a cervix which is scarred only in certain areas, the incision should be made in the healthy tissue away from the distortion, except where the simple cutting of a band or knob may be sufficient to allow dilatation to proceed.

Cesarean section is occasionally indicated, due to an extreme degree of scarring with danger of rupture of the uterus or adjoining viscera. In elderly primiparae particularly where a considerable extent of the canal is occluded, section is often necessary. Complications such as a vicious presentation or associated contracted or deformed pelvis will complete the indications for section. In urging a careful follow-up and report of these cases, the authors wish to point out that in cases coming to section, and especially those in which low cervical or Porro section is done, an excellent opportunity is offered for a careful study of the nature and degree of the stenosis from above. This should be carried out digitally, instrumentally, and visually where

possible, with the greatest care. There can be no case of this kind, which if conscientiously studied, will not be of definite value in the literature.

#### SUMMARY

Etiology.—The great frequency with which fibrosis occurs as the cause of true primary cervical dystocia is indicated. Conclusive evidence of the presence of continuous circular fibers (sphineteric type) is not forthcoming. It seems that ordinarily the caliber of the canal is maintained passively by the anatomic conformation of the organ as in the case of other nonsphineteric orifices. Doubt is cast upon the existence of such a condition as "spasmodic cervical contraction" during labor. In cases where such a diagnosis has been most frequently made, there are very often psychic or other general factors which, on careful analysis, will prove to be the actual cause. Other factors which may occasionally cause a cervical dystocia are discussed: syphilis, displacement of the os, adhesive membranes, overlapped cervical lips, etc. The condition called "Conglutinatio Orificii Externi" is considered.

Diagnosis.—In the diagnosis, extracervical factors must be eliminated and fibrosis should always be suspected. In its absence, the most frequent factors eausing an apparent cervical dystocia are (1) a misinterpretation of the patient's reaction to the very early stages of labor, giving the impression of prolonged labor without commensurate cervical change. (2) Active voluntary resistance to descent occasioned by the pain consequent upon pressure on the cervix.

Treatment.—If an apparent cervical dystocia is not due to fibrosis, the most favorable results will follow watchful expectancy and the advised use of sedatives. Such methods will decrease in efficiency in direct proportion to the degree of scar tissue involvement, but may be helpful in any case. The use of bleeding and the warm bath is discussed. The insertion of weighted bags where fibrosis is a factor is condemned. Manual dilatation is seldom advisable, and instrumental dilatation never. The correct use of incisions is advised and described. Vaginal and abdominal cesarean section are discussed.

#### REFERENCES

Ashwell: Guy's Hosp. Reports, 1837, 1840, ii. Ser. 1. Audebert: Ann. de gynée. et d'obst., 1898, xxii, 1. Boyer, A.: These Paris, 1890. Cotte, M. G.: Bull. Soc. d'obst. et de gynée. de Par., 1927, xvi, 275. Coventry, W. A.: Am. Jour. Obst. and Gynec., 1925, x, 805. Curtis, A. H.: Jour. Am. Med. Assn., 1927, lxxxix, 1191. DeLee: Principles and Practice of Obstetries, 1924, ed. 4, W. B. Saunders. Dickinson, R. L.: Am. Jour. Obst. and Gynec., 1921, xi, 600. Doleris, J. E.: Gaz. M. de Par., 1884, December to January, 1885. Dorset, L.: Am. Jour. Obst. and Gynec., 1927, xiv, No. 2. Ehrenfest, H.: Nelson's Loose Leaf Liv. Med., December, 1927, iii, 617. Fieux: J. Med. de Bordeaux, 1913, xiii, 641. Flandrin: Le Dauphine Medical, 1898, xxii, 1. Fulkerson, L. L.: Am. Jour. Obst. and Gynec., 1926, xii, 374. Gellhorn, G. A.: Jour. Am. Med. Assn., 1926, lxxxvii, No. 22. Guibot, J.: These Paris, 1900, No. 341. Henderson,

H.: Jour. Mich. State Med. Soc., 1918, xvii, 336. Hisgen, H. Z.: Zentralbl. f. Gynäk, 1920, xliv, 885. Kassansky, B. A.: These Paris, 1906. King, C. E.: The Med. Standard, 1893, 137. Le Bigot: These Paris, 1899. Le Page, M.: Rev. gen. de clin. et de therap., 1903, 582. Magid, M. O.: Am. Jour. Gynec. And Obst., 1927, xiv, 371. Magid, M. O.: New York Med. Jour., 1921, cxiv, 387. Matthews, H. B.: Jour. Am. Med. Assn., 1926, lxxxvii, No. 22. Mathieu, A.: Am. Jour. Obst. And Gynec., February, 1927, xiii, No. 2, 223. Mauclaire and Bernier: Arch. gen. de chir., 1909, 4. Paddock, C. E.: Surg., Gynec. and Obst., 1912, xiv, 40. Pessner: Berl. klin. Wehnschr., 18 mars, 1895. Pichevin: Semaine gynec., 1898, 33. Pinard: Compt. rend. Soc. d'obst. de gynec. et de Paed. de Par., 1899, 5 premiers Nos. Polak, J. O.: Appendix, Gynec. and Obst. Monographs, D. Appleton & Co., 1925, 3. Polak and Phelan, G. W.: Am. Jour. Obst. And Gynec., 1923, v., 640. Potel, G.: Arch. gen. de chir., 1909, clxl, 119. Porter, M. F.: New York Med. Jour., July 9, 1910, 77. Rascol, M.: Bull. de la Soc. d'obst., 1927, xvi, No. 8, 559. Rascol, M.: Bull. de la Soc. d'obst., 1927, xvi, No. 8, 559. Rascol, M.: Bull. de la Soc. d'obst., 1927, xxiv, Oc. 8, 559. Rascol, M.: Bull. de la Soc. d'obst., 1927, xxiv, 644. Seredey, M. A.: Ann. Gynec. and Obst., 1904, Ser. 2. Sturmdorf, L.: Gynoplastic Technology, E. A. Davis Co., 1925. Taurin, V. A.: These Paris, 1895. Tisscrant: These de Nancy, August 11, 1882, 149. Toledo: These Paris, 1890. Toneff, E.: Gynec. et obst., 1926, xiv, No. 6, 384. Vignes: Surg., Gynec. and Obst., 1924, 345. Viguier: These Paris, 1874. Williams: Obstetries, Appleton, 1921.

MEDICAL ARTS BUILDING.

## INTERNAL ROTATION OF THE HEAD WITH REMARKS ON THE KIELLAND FORCEPS\*

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It is generally taught that the head enters the pelvis in one of the oblique or the transverse diameters of the pelvic inlet, and during its passage through the birth canal the occiput rotates in one direction until it comes directly anterior or rarely directly posterior. If it enters with the occiput anterior or transverse, the rotation is forward through an arc of 45 or 90 degrees. If the occiput is posterior the rotation is forward through an arc of 45 degrees, or rarely posterior through an arc of 45 degrees.

The frequency with which heads are found directly transversely, regardless of the original position whether anterior or posterior, is very striking. Careful observation by vaginal examination is convincing that the head will pass through this position during labor. The level at which this occurs is that of the ischial spines or the plane of the least pelvic dimensions. So far I have been unable to explain just why this occurs. However if this is true, and I believe it is, the mechanism must be as follows:

Occiput Anterior.—The head enters the pelvis in one of the oblique diameters of the pelvis, and during its passage from the inlet to the spines the occiput rotates posteriorly through 45 degrees to the trans-

<sup>\*</sup>Read before the St. Louis Gynecological Society, January 13, 1928.

verse position, and then in its further passage to the outlet, rotates anteriorly through 90 degrees to bring the occiput under the symphysis.

Occiput Transverse.—The head enters the pelvis in the transverse with the occiput directed to the left or right (noticeably in flat pelves), and continues in this position during its descent to the spines and then rotates anteriorly through 90 degrees as it reaches the outlet.

Occiput Posterior.—The head enters the pelvis in one of the oblique diameters with the occiput posterior, and during its descent to the level of the spines rotates forward through 45 degrees to the transverse position. In its further descent it either rotates forward through 90 degrees to bring the occiput under the symphysis or rotates posteriorly through 45 degrees to its original position in one of the oblique diameters. If the latter occurs and labor ends spontaneously the occiput rotates anteriorly through 135 degrees or rarely posteriorly through 45 degrees to the hollow of the sacrum.

The generally accepted explanation for the mechanism of rotation is that this process is either due to the resistance of the levator ani muscles forcing the head to turn; or that the child, acting as a cylindrical body that can bend readily only in one direction, is forced through the pelvic canal as through a curved tube. Here the most pliable portion, which in the case of the child is the neck, adapts itself to the curvature of the pelvic canal by extension, thus bringing the occiput forward. If this is true, rotation is the result of descent, and the arrest of one causes the arrest of the other. In other words, in cases of dystocia the lack of descent is the primary factor and the lack of rotation secondary. Thus if descent is aided, rotation should follow of itself and seemingly it does so in many cases. The cases we are most frequently called upon to assist instrumentally are the deep transverse arrest cases of DeLee, i.e., where the head is at, or slightly below, the level of the spines with the sagittal suture transversely, or where the occiput is posterior with sagittal suture in the oblique position and the head below the spines. The deep transverse arrest always occurs where the descent is hindered by a funnel pelvis, or very prominent ischial spines, or an immobile coccyx. Occiput posterior rotation most frequently occurs in funnel pelves, and descent is hindered, in addition, by the poor flexion of the head usually present, offering a larger diameter for passage. Traction alone by forceps on a head in the transverse will very frequently result in spontaneous rotation of the head when it reaches the point where it would normally rotate, i.e., the pelvic floor. The same is true, but to a lesser degree, with the occiput posterior. Thus it seems as if our efforts in delivery in unrotated heads should be primarily aimed to assist descent and only secondarily rotation. There are, of course, many cases where the rotation must be deliberately done.

Effecting delivery in this manner is most easily done by the use of a straight forceps or the one devised by Kielland in 1915 and used rather extensively in Europe but less so in this country. Its chief advantages are its very slight pelvic curve and the sliding lock which make a correct cephalic application much easier and more certain than in the forceps with a pelvic curve and fixed lock. The perfect cephalic application and the traction in the axis of the child and the pelvis, which is possible without a pelvic curve of the instrument, seem to make the spontaneous rotation more apt to occur when traction is applied, and if it does not occur of itself is more readily accomplished. With the occiput posterior the very slight pelvic curve frequently makes possible the application with this slight curve toward the occiput and the delivery with a single application of the forceps instead of the double application of the Scanzoni maneuver or its modification by Bill. It is claimed that the Kielland forceps decreases the chance for injury to the child's head and the mother's soft parts. This seems to be true because of the correct cephalic application that is easier to obtain and because delivery apparently can be completed with less traction, since it is exerted directly in the axis of the child and not off center as is the case when the forceps has the usual pelvic curve.

For a very clear and comprehensive description of the forceps, its uses, advantages and technic of application the reader is referred to Jarcho's article in the American Journal of Obstetrics, Vol. x, p. 1. At first reading, the description of the application of the anterior blade upside down and then turning it over seems extremely dangerous, but after using the procedure one is convinced that it is perfectly safe, provided no force is used. The turning of the blade is surprisingly easy and if not it can still be introduced as the ordinary forceps. When the head is high, it is more difficult to apply the anterior blade by the Kielland technic.

#### CONCLUSIONS

The head during its passage through the birth canal rotates to the transverse position at the level of the plane of the least pelvic dimensions regardless of its original position.

Since descent is primary and rotation is secondary, assisting descent by traction should cause rotation to occur, and it does in many cases if a straight forceps is used.

The Kielland forceps with its very slight pelvic curve and sliding lock is the most satisfactory and offers advantages that make its use on unrotated heads desirable.

503 WALL BUILDING.

## THE PHENOLTETRACHLORPHTHALEIN TEST OF LIVER FUNCTION IN THE LATE TOXEMIAS OF PREGNANCY

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THE Rosenthal test of liver function was undertaken three years ago with the hope of finding some method which would throw additional light on the various forms of the late toxemias. Clinically it is most difficult to differentiate the nephritic and precelamptic types of toxemia. Harris<sup>1</sup> does not attempt to classify the late toxemias until three weeks following the termination of pregnancy where the criterion is the presence or absence of renal involvement. In no case was it felt that a conclusive diagnosis could be reached before the expiration of this period, except in patients who died and came to autopsy. Plass<sup>2</sup> also agrees that it is almost impossible to differentiate the two types and after extensive studies of the blood chemistry concludes that such studies are at present of little or no aid in the clinical management of these cases and that the older methods of examination, namely, urinalysis, blood pressure readings, and ophthalmoscopy yield the most valuable information concerning the patient's condition. Our experiences, having coincided exactly with theirs, we turned to the study of the excretion of phenoltetrachlorphthalein seeking for a new source of assistance on this problem.

Autopsy findings usually show fairly extensive liver damage in the eclamptic group. Consequently the theory was proposed that in this group, retention of dye should be found, and very little or no retention in the nephritic. Rosenfield and Schneiders3 conclude that the test is a more accurate index of existent toxemia than variable clinical symptoms, and that it may be possible by means of it to anticipate the clinical picture in forming an opinion as to the degree of toxicity existent at a given time. They further state that it will aid greatly in serving as an index of treatment and assist in determining the time at which a therapeutic abortion or induction of labor should be performed. Krebs and Dieckmann4 also think that this test offers considerable promise in the management of the toxemias. Smith<sup>5</sup> feels that more time is needed to form a reliable opinion as to the true value of the test. He believes, however, that the more severe cases show retention and that they are of the preeclamptic type rather than of the nephritic. King<sup>6</sup> believes that it is of service in differentiating between the nephritic and preeclamptic types of toxemia, and that the degree of retention seems to correspond with the clinical findings.

The method employed is essentially that described by Rosenthal.7 Five-tenths milligram of the dye per kilo of body weight is injected intravenously. Care must be taken to prevent any from entering the tissues, since an alteration in the correct result of the test may thus be brought about. The best method of injecting the dye is by means of a three-way stopcock arrangement, washing the syringe out carefully with normal salt solution. Specimens of blood are collected preferably from the other arm at fifteen minute, one hour, and two hour intervals. Dissolved hemoglobin interferes with the readings, so dry needles or those boiled in salt solution should be used. The blood should be allowed to stand until the clot has reacted. The blood serum is then alkalinized with 5 per cent NaOH and the resulting colors are compared with standards in a comparator. Smith has found that in normal pregnancy 3 to 5 per cent of the dye is recovered in the fifteen minute interval, a trace to 1 per cent at the end of an hour, and nothing to a trace at the end of two hours. The limit of normal may be considered 7 per cent after fifteen minutes, 3 per cent at the end of an hour, and a slight trace at the end of two hours. Ottenberg<sup>8</sup> and his colleagues have noted that 5 per cent in the hour specimen may be considered a suspicious sign of liver impairment, while 8 per cent or more is conclusive.

The test has been used on 118 cases. Forty-four of these have been previously reported.<sup>5</sup> No classification into nephritic and preeclamptic groups has been attempted, and only those with convulsions have been separated. Of these 118 cases, 34 showed retention of the dye in varying amounts, 84 had none. In the group with retention 9 died, in the other group, 3 died. There were 20 with convulsions, 10 having retention, and 10 without any, and 3 in each group died. Such parallel figures in the group with convulsions are indeed surprising. As far as we can tell, none among these had a history of previous chronic nephritis and consequently cannot be classified as a chronic nephritic with convulsions.

Inasmuch as the occurrence of convulsions is the terminal event in either group, it is felt that a more accurate and satisfactory conclusion can be reached by confining our analysis to this group. In the group without convulsions most of the cases with retention have been sent to us in a neglected state, having had either no treatment or at best very inadequate, while a large percentage of the group without retention has been watched carefully in the prenatal clinic and sent into the hospital at the early appearance of symptoms, and in a large number the test has been performed many days before delivery. In the convulsive group, however, most of the patients have come to us in the eclamptic state, and the test has been done just before or following the onset of convulsions. Therefore, it seems that this group should offer us a much more correct estimate of the value of this test.

On careful analysis of the cases, one is immediately impressed by the similarity of symptoms, blood pressure elevation and albuminuria, and if the result of the response to phenoltetrachlorphthalein were unknown. it would be impossible to differentiate them. In the group with retention, 5 had convulsions antepartum, and in 5 labor was induced. The amount of retention seems to be no index of the severity of the disease. Case 32133 (Table I), was the least sick of any, yet here was a greater amount of dye retention than any other excepting one which was fatal, Case 29961. Greene<sup>9</sup> and his coworkers believe that readings of at least 10 per cent at fifteen minutes, 5 per cent at the hour, and 3 per cent at the two hours are required before they can be significant of hepatic disturbance. Eight cases had retention of 5 per cent or more at the hour period, and 8 showed 3 per cent or more at the two hour reading, but only 3 had 10 per cent or more at the hour and only 2 had 6 per cent or more at the two hour interval. Thus in most of the cases the amount of retention was not large.

The possibility of dye retention prognosticating the occurrence of convulsions is indeed interesting and if correct, would be of great value, but our hopes have not been realized. Unfortunately in most of the eases, convulsions had set in before this test was done, yet there are a few in which it was recorded prior to their occurrence. Case 30737 (Table II) was six months' pregnant and entered with a blood pressure of 180 and a large trace of albumin. There was no retention. Six hours later she complained of epigastric pain. A bag was inserted at once, and three hours following this she had a convulsion. Case 32083 was six months pregnant and entered with a blood pressure of 160, a large trace of albumin, and considerable edema. She appeared listless and apathetic. There was no retention of dye. The next morning without any prodromal warning she had a convulsion. Case 31827 entered in labor with partial separation of the placenta. She was close to term with a blood pressure of 132 and a large trace of albumin, complaining of headache and blurred vision. Since her vagina had been packed with unsterile cotten before entrance it was deemed inadvisable to deliver by cesarean section, so a Voorhees bag was inserted. There was no retention of dye. Five hours later she had a convulsion. Case 32189 (Table III), entered in labor and was delivered of a normal full term baby. She had moderate retention. Three days later she had a convulsion. This was the only case with retention known before delivery in which convulsions took place.

Two cases of postpartum eclampsia add to our difficulties in evaluating this test. They entered the hospital at nearly the same time, had almost identical histories and clinical courses, and similar endings, but one had retention of the dye and the other had none. Case 32058, trigravida, aged twenty-seven, had two previous normal pregnancies.

TABLE I. ECLAMPTICS WITH RETENTION

CASE		PREV	PREVIOUS	HUNOM	SYSTOLIC	ALBUMIN	SWMPTOMS		DYE	7	TIME IN RE-	COMMENT
NO.	AGE	GRAV.	RAV.   MISC.	THE CAN PARK	PRESSURE	URINE		15"	I'	Ģ1	DELIVERY	
29961	41	9	0	00	180	l.t.	Admitted in convulsions	o 51	13.50	13	1 hour before 6 hours before death	1.
31115	65	en	0	<u>L</u> =	170	1.t.	Headache, stu-	<del>+</del>	co	01	4 days before	4 days before Voorhees bag. Well.
							One convulsion before delivery	,	9		-	Vocabase have Died un-
20402	17	10	0	Term	055	1:	Great edema, stupor, head-	10	0	+	fore death	fore death delivered.
							vision. One					
30504	18	-	0	Term	150-220	1.t.	Convulsions 4	15	6	10	4 hours after	4 hours after Breech extraction, Well.
							hours after de-	9	tr	0	denvery 15 days after	
11200	2.4	c	-	9	180	l.t.	Marked edema,	9	9	0	1 hour before	1 hour before Vaginal hysterotomy.
E E F F F F F F F F F F F F F F F F F F							blurring of	+	tr	0	18 days after	18 days after Well. Previous toxemia with convulsions.
		,			10	*	eonvulsions Convulsions 1	o'	to	er:	hour	after Well.
30929	901	-	0	ICE	740	3.6	hour after de-	tr	0	0	5 days after	
32058	10	60	С	Term	210	l.t.	livery 10 convulsions after delivery	10	00	10	14 hours after	14 hours after Twins at home, Convulsions 12 hours later.
23 23	80	00	0	Term	120	s.p.t.	One convulsion	10	133	11	Died. 1 hour before Well.	Died. Well. Had toxemia in
32180	121	60	0	2	110	1.t.	during labor H e a dache,	10	60	-	4 hours before Induced	Induced with bougie.
							blurred vision,					Well.
							convulsions be- fore delivery					
32189	65	9	0	Term	170	1.t.	Convulsions 3 days after de- livery	51	G.	63	1 hour before Well.	Well.

TABLE II. ECLAMPSIA WITHOUT RETENTION

				24 hour																		Quick	easy delivery. Died 12 hours later of shock	
	Ly			Died	Well										delivery				Well			es bag.	12 hou	
	COMMENT			otomy.	honorie.	0.00				Well					after				ougie.			Voorhee	. Died	
				hyster	with					s bag.					hours				with 1			with	elivery ek	
			Well	be- Vaginal hysterotomy. Died 24 hours	be Induced with bonoie.		be- Well	Well		7 hours be- Voorhees bag.			Well		Died 30 hours after delivery				1 day be Induced with bougie. Well			2 hours be Induced with Voorhees bag.	easy d	
N	OL NO	ER I	oc.					be-		be-			m		76				pe-			pe-		
TIME IN	RELATION TO	VELLIV	24 hours	1 day	1 day	fore	1 hour	2 hours be- Well	fore	7 hours	fore		4 hours	after	12 hours	after			1 day	fore	after	2 hours	fore	
	NO	23	0	0	0		0	tr		tr			0		t.				0		21	tr		
DYE	REFENTION	7	21	tr	0		ţ	Н		03			_		-				-	c	9	10		
	RE	CI	+	9	***		9	60		13			9		9				9	8	0	01		
			hr.	One	lsions	ee e		nefore	bost-	Blindness.	pla-	-luvuc	con.	rtum	y at	convul-	blur-		Much	-luvuo	livery	pla-	deliv-	
	SYMPTOMS		anvulsions 12	ic pain.	convu	before entrance	apartun	=	۱۵ کرد		Separation of pla-	centa. One convul-	e. One	vulsion postpartum		10	Headache and blur-	ring of vision	,	edema. One convul-	s:on before delivery	n of	centa. Five convul- sions before deliv-	
	SS		Convulsions 12	Epigastric pain.	Several convulsions	before	Two intrapartum con-	6 convu	delivery,	Headache.	Separa	centa.	Headache, One con-	vulsion	Normal	home.	Headac	ring of	Headache.	edema.	s:on pe	Separation of pla- 10	sions 1	Ory
ALBUMIN	TRINE	CHANTAL	l.t.	l.t.	1.t		-:	l.t.		1.t.			1.t.		1.t.				I.t.			1.t.		
SYSTOLIC ALBUMIN	BLOOD	THE PROPERTY OF	130-200	550	168		158	046		132			178		118				160			180		
	MONTH		Term	9	I+	-	Term	Term		Term			Term		Term				9			Term		
PREGNANCIES	NOTES	MISC.	0	1	0	0	0	0		0	•		0		0				0			0		
	PREGNA	UKAY, MISC.	-	10	-	,	-	10		1			1		cvi				-			01	***	
4 41 810	AGE		01 00	80	25	1	17	39		21			19	0	65		******		50			30		
CASE	NO.	100	30553	30737	31370	000	31393	31705		31827	-		32063		82071				32063			32384		

She was delivered of her third at home. Eight hours later she had a convulsion, and four more before entrance to the hospital. On admission she was comatose, had a blood pressure of 210, and a very large trace of albumin. Here she had five convulsions and died of pulmonary edema and myocardial failure nineteen hours after entrance. She had a reading of 10-8-5. Case 32071, secundigravida, aged twentyeight, had one previous normal pregnancy. She was delivered of her second at home. Seven hours later she had a convulsion and three more before entrance to hospital. She was comatose, had a blood pressure of 118, and a very large trace of albumin. Here she had three convulsions and died of pulmonary edema and myocardial failure eighteen hours after entrance. There was no retention of the dye. Both cases were treated in the same manner. Autopsy in each case showed about the same pathologic picture. The liver had areas of peripheral necrosis, and the kidneys showed evidence of an acute tubular nephritis. The first had a blood nonprotein nitrogen of 30 and uric acid of 8; and the second had a nonprotein nitrogen of 26 and uric acid of 8. parallelism of these two cases is striking, yet why one should show retention of the dye and the other have none is difficult to explain.

The differentiation of the preeclamptic and the nephritic by the presence or absence of dye retention would be of major significance and would firmly establish this test as a routine procedure. majority of chronic nephrities show no retention. Yet some in whom retention had been demonstrated have returned with evidence of a nephritis. Sixty-one cases have been seen in a period from six months to two years following delivery. Careful records have been kept of their blood pressure readings and urinary findings. Forty-six were in the nonretention group and 19, 41 per cent, showed blood pressure elevation or urinary changes or both. Fifteen were in the other group and 5, 33 per cent, proved to be abnormal. The number of cases is small and the method of classification clinical. No elaborate chemical studies have been attempted. But the trend of affairs seems to be fairly well indicated. Of course, it is not known whether the nephritis has been the underlying cause of the toxemia or originated as a result. Much further investigation is needed to settle that question. Thus far, however, the presence of dye retention has not appreciably reduced the percentage of patients with signs of nephritis.

Twenty-six patients in this series have returned with another pregnancy. These have been watched with great interest. Of 6 who had shown retention previously, 5 had no symptoms. One had a mild toxemia and was delivered of a full-term living child. She had no retention this time. Twenty had had no retention. Six of these were normal, although one had a premature baby at seven and one-half months. She was free from toxic symptoms. Of the remaining 14, 3 who had had hyper-

TABLE III. DEATHS

Ve	AGE PI	PREV	PREGNANCIES	MONTH	SYSTOLIC ALBUMIN BLOOD IN	ALBUMIN IN	SYMPTOMS	R	DXE	FION	TIME IN RELATION TO	COMMENT
	5	GRAV. MISC.	MISC.		PRESSURE	URINE		15"	1,1	91	DELIVERY	
29961 41	1	9	0	000	180	l.t.	Admitted in con- 9 vulsions	6	13		1 hour be	13 1 hour be- Voorhees bag. Low forceps. Died 72
								21	28	16	9	7
30224 30	0	ଚ୍ଚ	0	l=	168	l.t.	Epigastric pain	9	•		1 month be	0 I month be Voorhees bas. Normal delivery Died 3
				ο.	28	l.t.	Enjoyethin main	c	9	4	fore	hours later apparently in shock
70100	_	h	<	8			53	9	0	1		1 day be- Autopsy: Peripheral hemorrhagic necro- fore sis of liver
9	_	0	0	Term	077	;;	Edema, stupor, 10	10	10	7	1 hour be	1 hour be Voorhees bag. Died undelivered
							blurred vision, 1				Tore death	
30437 33	00	***	-	Term	180	l.t.	Edema, headache	6	00	-1	1 hour be-	I hour be Voorhees bag. Version. Died immedi-
		,	0	c	000						fore	ately after delivery. Severely septic on entrance. In labor three days
1	4		0	o	166	+:	Marked edema, very drowsv	9	10	¢1	2 days be-	days be Vaginal hysterotomy. Died 60 hours later
								9	4	17	1 day be-	1 day be tubular nephritis
								1-	6	I	Inst after	

TABLE III .-- CONTINUED

CASE	AGE	PREGNANCIES	PREVIOUS	MONTH	SYSTOLIC ALBUMIN BLOOD IN	ALBUMIN	SYMPTOMS	RI	DYE	ION	TIME IN RELATION TO	COMMENT
NO.		GRAV. MISC	MISC.		PRESSURE	URINE		15"	1,	,03	DELIVERY	
30737 3	38	2	1	9	220	l.t.	Epigastrie pain.	9	tr	0	1 day be-	1 day be- Vaginal hysterotomy. Died 24 hours fore
												Autopsy: Slight peripheral hemorrhages and slight central necrosis of liver
30824 2	25	Н	0	Term	160-180	l.t.	Slight edema	11	10	00	2 days be	2 days be Voorhees bag. High forceps. Died 9
											fore	days later of september Autopsy: Mild toxic degeneration of
31963	30	o	C	00	066	1.t.	Headache, nausea,	10	00	-	10 hours be-	1 10 hours be Induced with bougie. Died in coma 4
	2	,	>				vomiting, blind-				fore	hours after delivery  Autopsy: Peripheral necrosis of liver
	1	(	(	E	0	:	or .	10	0	12	7. 1.4 bourse	and acute tubular nephritis
220028	17	70	0	Term	210	1.1.	hours after de-	ar.	0		after	Autopsy: Peripheral necrosis of liver
	9	(	(	E		+	livery	4	-	-	10 bonne	and acute tubular nephritis
32071	53	21	0	Term	118	I.t.	ter delivery		4	3	after	later
												Autopsy: Peripheral necrosis of liver and acute tubular nephritis
32268	56	1	0	Term	240	1.t.	Edema, headache, 12	15	00	4	24 hours be	4 24 hours be Induced with bougie and bag. Version.
							blurred vision	-	,			Died in coma 24 hours later
32384	30	<b>c</b> 1	0	Term	180	l.t.	Several convul- 10	10	0	tr		3 hours be Separated placenta. Voornees bag. INST- fore mal delivery. Died in coma 12 hours
							trance					later
												Autopsy: Peripheral neerosis of liver

TABLE IV

			FIRE	FIRST ADMISSION	NOI			AT GOOVT			SECON	SECOND ADMISSION	The second secon
CASE NO.	GRAV.	GRAV. MONTH	SYSTOLIC ALBUMIN BLOOD IN PRESSURE URINE	ALBUMIN IN URINE	BYE RETENT	DYE RETENTION	NOI	RESULT	MONTH	SYSTOLIC ALBUMIN BLOOD IN PRESSURE URINE	ALBUMIN IN URINE	DYE	RESULT
								Retention of Dye	2	And the second s			
30139	i	9	180	l.t.	10	10	60	Miscarried	Term	120	0	Not done	Well
0504		Term	150-220	Lt.	120	0	00	Convulsions 4 hr. af- ter delivery		110	0	Not done	Well
563		Term	160	ئ	10	+	00	Well	Term	150-160	s.p.t.	Not done	Well; headaches
846	0.500	Term	140-160	ئد	90	10	00	Cesarean; well	Term	120		Not done	Well
151		Term	140	4.5	14	×	00	Cesarean; well	Term	110	0	Not done	Well
31821	vi	00	.160	0	11	œ	10	Well	Term	110	0	Not done	Well
								No Retention of Dyc	)ye				
368		00	180	ţ	00	00	0	Well	Term			Not done	Well
30427	•==	10	066	».t.	9	t	0	Misearried; chronic nephritis	10	861	1:	3 1 0	Abdominal abortion and sterilization. Has chronic neph-
													ritis
472	* ****	1	180	0	01	0	0	Premature labor	Term	150	0	Not done	No symptoms
938		Term	144	8.t.	10	_	0	Well	Term	150	0	Not done	Well
00		Term	140	s.t.	+	_	0	Twins: well	Term	120		Not done	Well
109		Term	115	نډ	10	0	0	Well	Term	120		Not done	Well
31370		7	168	l.t.	~	0	0	Several convulsions.	1	115		Not done	Premature labor with-
								5					out any reason

TABLE IV-CONT'D

			FIR	FIRST ADMISSION	SION						SECON	SECOND ADMISSION	
CASE NO.	GRAV.	MONTH	SYSTOLIC ALBUMIN BLOOD IN PRESSURE URINE	ALBUMIN IN URINE	RET 15'	DYE TENTI	00 N	RESULT	MONTH	SYSTOLIC ALBUMIN BLOOD IN PRESSURE URINE	ALBUMIN IN URINE	DYE	RESULT
								No Retention of Dye	Jye				
31843	1	00	170	s.p.t.			xtr	Premature labor; well	_	160	s.t.	No retention	Well
31603	1.	Term	154	0	55	01	0	Well	Term	150-160	0	No retention	Well
31827		00	132	1.t.		01	0	P	Term	150-170	s.t.	No retention	Well
								One convulsion. Voorhees bag					
32335		Term	170	0	00	0	0	Well		170	0	No retention	No retention No symptoms
30104		00	150-160	ئد	1-	60	0	Well	Term	138	t,	Not done	Well; twins
30349	-1	00	170-180	s.t.	10	01	0	Voorhees bag; well	Term	120	0		Well
32168	11	90	140	, t	10	01	1	Diabetic induced with		180	s.t.	uo	Voorhees bag; well
								bougie; well	00				
30607	iii	Near	240	t,	-	91	0	Voorhees bag; well	4	190	0	Not done	Miscarried; chronic
30435	. [	Near	140	s.t.	4	tr	0	Twins; well	Near	160	s.t.	Not done	Voorhees bag; well
		Term	3		1	(	-		Term	(			
30748	-	00	150	l.t.	20	21	=	Voorhees bag; well	Term	140			Well
32065	×	00	170	1.t.	60	_	0	Chronic nephritis	Term	180	l.t.	Not done	Induced with bag
31033		Term	150	s.p.t.	+	_	0	Well	9	170		Not done	Macerated fetus;
													chronic nephritis
32166		t-	135	J.t.	4	C1	0	Much edema; well	-1	170	. T.t.	Not done	tam
							-						fetus Maceraled

tension as the only symptom reacted similarly in the second pregnancy. Three were definitely known chronic nephritics. Case 30427 (Table IV) had miscarried at five months with a most severe toxemia. She was just as sick this time at the same period, and was aborted and sterilized. Case 30607 in whom labor had been induced close to term, miscarried at four months with a blood pressure of 190. In Case 31865, labor was induced at eight months and a living premature baby was born. Eight had a recurrence of the toxemia. In 6 it was less severe than in the preceding pregnancy. One had convulsions at the seventh month, and one who previously had gone to term with a mild affair delivered herself of a macerated fetus at six months.

From the above series, one gathers the impression that those patients in whom a retention of the dye was found to go through a succeeding pregnancy without any repetition of toxemia. Only one among them had any difficulty, and it was minimal. In the nonretention group, however, the majority failed to have smooth sailing. Of the three chronic nephritics one miscarried, one was aborted, and one had a living premature baby. This finding coincides with the known small possibilities of chronic nephrities securing live babies. The three with hypertension withstood this pregnancy better than the first. Case 30472 went to full term this time, whereas before she went into labor prematurely at seven months. She has again reached term without any other symptom than a blood pressure of 150. Case 31603 has recently completed her third pregnancy at full term without any untoward symptoms. Her blood pressure ranged between 130 and 138, lower than her two previous pregnancies. Among the 8 pregnancies with a recurrence of toxemia, labor was induced in two close to term. Four went into labor spontaneously at full term. In these six, the toxemia was of less severity than in the previous pregnancies. This is most likely due to the careful prenatal supervision. Case 32166 who returned with convulsions had no prenatal care. She cleared up very quickly and now shows no residual symptoms. Following her first pregnancy, we were unable to classify her. She failed to return for further study, but on discharge from the hospital, her blood pressure was 130 with a trace of albumin in the urine. Case 31033 was delivered of a living baby at term. About a month before delivery, she had a blood pressure of 150 and a s.p.t. of albumin. She was sent into the hospital, and responded well to treatment. She was then followed in the antenatal clinic until delivery. Her blood pressure and urine returned to normal a few days postpartum and she was well on discharge. She did not come back until pregnant again at six months with a blood pressure of 175 and a trace of albumin. She was immediately sent into the hospital and remained about the same for two weeks when suddenly the baby ceased moving and she was delivered of a macerated fetus. Nearly half of the placenta was in-

fareted. Among the 8 patients who had a recurrence of toxemia this seems to be the only one who probably has nephritis. The others have a faulty kidney reserve without doubt and show no disturbance of function when not pregnant. Whether the eclamptic has an underlying nephritis is difficult to say.

Of the 20 with retention, 14 had symptoms of toxemia. One celamptic and three nephritics failed to attain their goal, a living baby. The others succeeded. But did they unduly risk damaging their kidneys seriously? Two of the three with hypertension have had their third pregnancies and seemingly have improved each time. Six of the 8 with a recurrence of toxemia had a milder course than before. One developed eclampsia and one nephritis. Possibly the kidneys will not endure the strain in the next pregnancy and other nephrities will be added to the list, or they will bear up well and nothing happen. The question cannot as yet be answered. But it does seem that this nonretention group harbors by far the greater number of potential nephrities.

Before passing final judgment on the value of this test, it must be borne in mind that the liver has many functions. It is also an organ with a large factor of safety, inasmuch as a goodly portion can be removed without causing any noticeable disturbance in function. Rosenthal<sup>10</sup> has found that 12 per cent of liver substance in rabbits can be removed before the occurrence of any retention. Its reserve power is also very large. An animal can live on 30 per cent of the normal amount of liver tissue. The complexity of hepatic function makes it appear evident that this dye is by no means capable of measuring it as a whole. There is yet no known test which has this ability. In any disease of the liver it is most unlikely that all the functions are deranged or at least equally involved. Retention of the dye does not necessarily indicate a deficiency in the performance of the normal metabolic functions of the liver. Only the excretory power of the liver is measured, and there must be a variation in the excretory power of different individuals. Consequently, one must be guarded in his conclusions.

Another factor to be carefully considered is the acuteness of this disease. The prevailing view is that some toxin engendered in the placenta is the causative agent of toxemia. The severity of symptoms is governed by the amount of toxin liberated. Undoubtedly a large amount of this substance can be freed in a short space of time, or there can be a cumulative action. There are numerous people showing mild symptoms for a short time, who suddenly become overwhelmed. Again there are many others running along smoothly and normally who without any warning grow desperately sick. The rapidity of the change is remarkable. Equally swift are the variations in the amounts of dye retention. Patients with no retention may develop a fairly large amount in forty-eight hours. Likewise, nearly all with retention return to normal in two to seven days after delivery. A few cases have had diminished amounts of retention at weekly intervals. Probably in no condition are more striking changes encountered. The experimental work of Lamson and McLean<sup>11</sup> on the toxicity of carbon tetrachloride is probably a very good example of the action of this toxin and the response of the liver to it. Four e.c. per kilo of earbon tetrachloride given by stomach tube to dogs produced a functional change in forty. eight hours and gave the following curves with phenoltetrachlorphthalein: (1) 9-6-6, (2) 15-10-8, (3) 12-7-6. In ninety-six hours the animals recovered and there was no retention. This shows the tremendous ability of the liver to maintain its normal equilibrium. Smaller and divided doses of this substance caused no symptoms and no retention. Among our eases are many comparative results. Perhaps many with no retention would have shown some a few days later had the pregnancy been permitted to continue. A large number of our cases were discovered early and the pregnancy interrupted. This may partly explain the preponderance of negative tests.

#### DISCUSSION

The Rosenthal test has been performed on 118 cases of toxemia. In 34 varying amounts of dye retention have been found. In the majority, the amount of retention has not been large. The most significant observation is the presence of 10 eclamptics with retention of the dye and ten with none, 3 dying in each group; and the striking similarity of symptoms, hypertension, and albuminuria. The presence or absence of the dye seemed to have no particular effect nor caused any fundamental differences.

A mortality of 9 in the retention group versus 3 in the other, however, is noteworthy. Two died of sepsis and should therefore be ruled out. Three died of eclampsia. Of the remaining four, Cases 31963 and 32260 (Table III) were moribund on entrance, each having had alarming symptoms for some weeks. They can be classed as badly neglected. The former had practically no retention, the latter only a moderate amount. Case 30224 was watched carefully, having had toxemia in a previous pregnancy. One month before delivery, she entered the hospital complaining of severe epigastric pain with a blood pressure of 168/68 and a large trace of albumin with many hyaline and granular easts. Liver function test was practically normal. She improved rapidly and eleven days later was discharged with a blood pressure of 110, a negative urine, and no symptoms. Eleven days later the blood pressure was 118, the urine contained a trace of albumin, and there were no symptoms. A week later, there was no change. Five days after this, she entered hospital again because of steady, severe epigastric pain which she had had for about six hours together with nausea, moderately severe headache, and slight blurring of vision. Blood

pressure was 180, and the urine contained a large amount of albumin. The liver function test showed some retention at the hour period, but only a slight trace at the two hour. A Voorhees bag was inserted and in three hours she was delivered of a normal living baby. About half of the maternal surface of the placenta was dark brown and necrotic looking. She bled more than a normal amount after delivery, but appeared in good condition. About a half hour after delivery, she went into severe shock and died three hours later. Autopsy showed a peripheral hemorrhagic necrosis of the liver and acute tubular nephritis.

Case 30674 presented herself at the clinic for the first time, seven months pregnant, with a blood pressure of 134 and a slight trace of albumin. There was no elevation of blood pressure, but an increasing albuminuria. She had no other symptoms until eighteen days following her first visit to the clinic when she noticed a sudden development of edema of the face, vulva, and extremities. The blood pressure now was 150/90, and there was a large trace of albumin with many granular and hyaline casts and numerous red blood cells. The liver function test showed a reading of 5 at the hour and 2 at the two hour. The next day, she was very lethargic and the abdomen badly distended. The blood pressure crept up to 160/110. Five hundred e.c. of blood were withdrawn without any apparent effect. The liver test was 4 at the hour with only a trace at the two hour. The output of urine had greatly diminished. She was worse the following day and was delivered of a living baby by vaginal hysterotomy under ether anesthesia. She was transfused with 500 c.c. of citrated blood and 500 c.c. normal saline. There was almost complete anuria, and the next day she was transfused again with 500 e.e. of citrated blood without avail. The anuria was now complete and in twenty-four hours she died. The reading at the hour was 9, the two hour was not taken. Autopsy showed an acute tubular nephritis and a central necrosis of the liver.

In both of these cases there was no significant amount of retention before delivery, and in the second there was a moderate amount just before death. In neither, at the autopsy, was found any particular degree of liver damage and no evidence of chronic nephritis.

In this entire series the amount of dye retention has been no index of the severity of the diseases and surely has had no prognostic value. The absence of dye retention has not allowed us to feel secure about the occurrence of convulsions, in fact, the reverse was the more usual. It is true that in the non-retention group the largest number of chronic nephrities are gathered, yet in the retention group, 33 per cent on further study showed evidence of nephritis versus 41 per cent in the other. The small number of cases may account for the seeming closeness of the percentages. In subsequent pregnancies, however, those with retention made by far the better showing, only one out of six manifesting any symptoms of toxemia. In the other group were 20 cases. One known chronic nephritic necessitated abortion at the fifth month, another miscarried at the fourth month, and another was delivered of a living premature baby. Three with hypertension as the only symptom acted similarly, and two of the three have had third successful pregnancies and have appeared to be in better condition than with the first. Six were perfectly normal, although one had a premature baby at seven and one-half months. Eight had a recurrence of toxemia. In six, it was of a less severe nature than in the preceding pregnancy. One had convulsions and a macerated fetus at 7 months, and the other passed a macerated fetus at 6 months with a blood pressure of 175 and a trace of albumin. This is the only case out of the eight which can be classed as a nephritic. The others undoubtedly have a deficient kidney reserve, but at present cannot be thought of as nephritics. They may be potentially more liable to develop this condition, but fall into the low reserve kidney group described by Stander and Peckham.12

It is worthy of noting that inasmuch as 60 per cent of eclampties are primiparae, 6 out of 10 are present in the nonretention group and only two in the other. Possibly we are overemphasizing the hepatic factor and should turn more to the renal. But it must not be forgotten that this test must be repeated very often on account of the quick changes of this disease, and that there are variations in the reactions of different individuals. Besides, it is only the excretory index of the liver for this particular dye. It seems that one would be assuming too much to state without reservations that this test differentiates the preeclamptic from the nephritic. Unquestionably more nephrities are to be found in the nonretention group, but the presence or absence of retention does not unequivocally label one as having a nephritic or hepatic toxemia. If this were possible, it would be very helpful in influencing the type of delivery and in advising about future pregnancies. Although interesting information has been derived from this study, no assistance has been offered in the management of these cases. Our only basis of treatment and prognosis depends entirely on the clinical condition of the patient.

#### CONCLUSIONS

1. One hundred and eighteen cases have been investigated. There were 20 cases with convulsions, 10 had retention of the dye in varying amounts and 10 had none. Three patients died in each group.

2. We have been unable to differentiate the nephritic and preeclamptic.

3. The majority of chronic nephrities had no retention.

4. Uncomplicated subsequent pregnancies have occurred in each group. The percentage of success was much greater in the group with retention.

5. This test has no practical value in the management of these cases. . The only index of treatment is the clinical condition of the patient.

#### REFERENCES

(1) Harris, J. H.: Bull. Johns Hopkins Hesp., 1924, xxxv, 103. (2) Plass, E. D.: Jour. Am. Med. Assn., 1924, lxxxii, 266-269. (3) Rosenfield, and Schneiders: Jour. Am. Med. Assn., 1923 lxxx, 743. (4) Krebs, O. S., and Dieckmann, W. J.: Am. Jour. Obst. and Gynec., 1924, vii, 89-96. (5) Smith, J. A.: Am. Jour. Obst. And Gynec., 1924, viii, 298-312. (6) King, E. L.: Am. Jour. Obst. and Gynec., 1926, xii, 577-585. (7) Rosenthal, S. M.: Jour. Am. Med. Assn., 1922, lxxix, 2151-2154. (8) Ottenberg, R., Rosenfield, S., and Goldsmith, L.: Arch. Int. Med., 1924, xxxiv, 206-227. (9) Greene, C. H., and others: Arch. Int. Med., 1925, xxxvi, 541-560. (10) Rosenthal, S. M.: Jour. Pharmacol. and Exper. Therap., 1924, xxiii, xxi, 237. (12) Stander and Peckham: Am. Jour. Obst. And Gynec., 1926, xi, 385-393. (11) Lamson, and McLean: Jour. Pharmacol. and Exper. Therap., 1923, 583-602.

483 BEACON STREET.

### COINCIDENCE OF FIBROID TUMOR AND EXOPHTHALMIC GOITER WITH THE REPORT OF A CASE CURED BY X-RAY CASTRATION\*

By Fred Lindenberg, M.D., Los Angeles, Calif.

THE interrelationship between the glands of internal secretion is a well-established fact. In a healthy state of life, when the equilibrium of these endocrines is not disturbed, we are usually unable to observe their correlation. In some of these observations, however, we recognize the manifold possibilities of influence between the ovaries and the thyroid gland. The most common phenomenon is the hyperemia of the thyroid gland during puberty, menstruation, pregnancy, and climaeterium. The enlargement of the thyroid during these markstones of female life is still considered as being within the borderline of normality, because the thyroid enlargement subsides after the above-mentioned periods have passed.

However, we find numerous reports of persisting struma, benign or toxic, the beginning of which can be traced to some of these periods of female life: the exophthalmic goiter during pregnancy, and the juvenile struma, contracted with the beginning of the germination period.

On the other hand, the ovarian function, or rather its dysfunction, is, according to our present belief, the cause of one of the most common of uterine neoplasma, the fibromyoma. Whether or not it is a hyper- or hypofunction of the ovarian hormone is as yet a matter not fully determined. Yet, from the very fact that we never encounter

Case presented before the General Staff Meeting of the Hollywood Hospital, October 25, 1927, and in the Obstetrical Section of the L. A. Co. Med. Ass'n on December 13, 1927.

a fibrous tumor before puberty while an existing fibromyoma often retrogresses after the menopause, the intramural type at least, we may justly assume the cause of fibroid growth due to ovarian activity.

While thus pathologic ovarian secretion is on one side the underlying cause of fibroid growth, it is on the other side stimulating thyroid enlargement. Small wonder, therefore, that both conditions, that of fibroid tumor and of thyroid enlargement, are often encountered simultaneously. Lynch reported in a recent paper on 502 cases of fibroid tumors the presence of thyroid enlargement in 30.2 per cent. Lynch characteristically calls the goiter a fibroid of the thyroid gland. Fibromyomatous patients without visible thyrotoxic symptoms mostly acquire a heart pathology generally referred to as Fibroma-Heart. Recent examination of the metabolism test in such patients revealed an increased rate averaging between 10 and 30 plus. The so-called Fibromyomatous Heart is nothing else but a thyrotoxic heart in a light degree.

The case I am going to report developed an acute thyroid toxemia on the basis of fibroid menorrhagia.

Mrs. J. R. W. was referred for severe menorrhagia and exophthalmic goiter. Patient was thirty-nine years of age, married for seventeen years, never pregnant. Menarche at sixteen years. Menstruation was always regular but scanty. Thirteen years ago a right ovarian cyst was removed. About three years ago the menstruation started to become more and more profuse and irregular. Within the last year the bleeding lasted about two or three weeks. For three months the patient has complained of shortness of breath, is easily fatigued, sleeps poorly, has persistent headaches, occasional attacks of dizziness and fainting, poor appetite, frequently feels nauseated, and complains of poor eyesight.

Examination on February 9, 1926, revealed the following status: face and mucous membrane very pale, slight exophthalmos, pulse 160, irregular, blood pressure 130-60, temperature 98; tonsils are small and teeth good. Hemoglobin 40 per cent. Pupils equal in size, react promptly. Graefe distinctly positive, thyroid gland somewhat enlarged, size small orange, soft. All reflexes exaggerated, marked demography, trembling of the outstretched hand. Heart sounds with slight anemic murmur, lungs negative.

Gynecologic examination revealed a fibroid tumor of the uterus, rather round and not nodulated. Size of about one and one-half fists.

The metabolic test could not be taken on account of the extreme nervousness of the patient.

Diagnosis.-Fibromyoma uteri, menorrhagia, exophthalmic goiter.

The interesting complication in this patient is the development of an exophthalmic goiter on the basis of a menorrhagic-fibroid tumor. The severe bleeding seemed to me the main problem and the underlying cause of the patient's thyrotoxic condition. She was in no way an operative risk, either for thyroidectomy or for hysterectomy. The type of the fibroid tumor, however, seemed a good indication for roentgen radiation, and as the patient's age was near the menopause, x-ray therapy was instituted.

Treatment.—I subjected the patient to x-ray treatment over the ovarial region giving 34 per cent castration doses. One treatment over each ovary, abdominal and dorsal on four consecutive days. Immediately following the radiation treatment

there was a severe aggravation of the thyrotoxic as well as of the menorrhagic symptoms, necessitating a consultation with an internist. The symptoms subsided, however, gradually within two weeks. The bleeding became less profuse and stopped within about three weeks, the fibroid tumor retrogressing in size. At the same time there was a marked improvement of the patient's general condition, nervousness became less pronounced, the pulse better, and hemoglobin went up.

Ten weeks later the uterus was only little more than normal size, and metabolic test showed +11.5. The Graefe symptom was the last one to disappear totally, after about six months. A recent examination of the patient showed her to be in perfect health. The uterus is atrophic, there is a small, soft, scarcely appreciable goiter more towards the left lobe which does not give any symptoms. The patient has not been bleeding any more.

There are two similar cases reported in the literature. Khoor reported a case in 1926, in which an exophthalmic goiter disappeared after a total hysteroophorectomy of an incarcerated fibroid tumor. Another case reported by Brown in 1924 is somewhat similar to the one I am reporting. A patient who had a benign goiter, and a menorrhagic fibroid tumor was given intrauterine mesentorium treatment. There developed suddenly acute thyrotoxic symptoms which subsided, however, in a few days. The fibroid tumor as well as the goiter shrank nearly altogether.

Groedel reported a case of struma with menorrhagia in which the goiter disappeared with the cessation of the uterine bleeding after ovarian castration. Manaberg reported in 1913 ten cases of basedow which reacted favorably to radiation of the ovaries. In mose cases of exophthalmic goiter the ovarial radiation is not indicated because the vast majority of cases show rather amenorrhic symptoms, not menorrhagia. Those patients with little or no uterine bleeding are even regarded as a contraindication to radiation.

Deutsch reported several cases in which slightly bleeding patients with fibromyomas who were subjected to x-ray treatments developed signs of myxedema in three cases. Groedel drew from these cases the conclusion: Ovarian castration may cause a hypofunction of the normally acting thyroid gland, but in exophthalmic goiter it may reduce the thyroid hyperfunction to normality, thus restituting the equilibrium of the endocrine glands.

While I do not wish to draw any definite conclusion from the single instance reported, the literature contains a number of cases with similar complications in which eastration was of great benefit. Proper selection of cases, especially in regard to the age of the patient to be eastrated and proper indication for x-ray therapy, are a "conditio sine qua non." In our case the x-ray castration was without doubt a life saving procedure.

1244 ROOSEVELT BUILDING.

### Society Transactions

#### NEW YORK OBSTETRICAL SOCIETY\*

MEETING OF MARCH 13, 1928

## DR. BYRON H. GOFF described A Case of Secondary Abdominal Pregnancy.

A Spanish woman of thirty-eight was admitted to the Woman's Hospital, July 7, 1927, complaining of constant, moderately severe, pelvic and lower abdominal pain, principally dull in character but at times sharp, and of 3 months' duration, amenorrhea of 16 weeks' duration followed by metrorrhagia of moderate degree which appeared two weeks before admission to the hospital, and an enlargement of the lower portion of the abdomen. Menstruation normal. The last regular period began on February 28, 1927, approximately 18 weeks before admission to the hospital.

The patient had been married for eight years, and had borne two full-term children, one seven and the other six years ago. The first pregnancy was complicated by lobar pneumonia at the seventh month. The second pregnancy was normal. Labors were spontaneous and the puerperia uneventful. There was no history of abortion.

With the exception of the attack of pneumonia which complicated the first pregnancy, the patient had had no other illness. There had been no history of pelvic inflammatory disease. Both husband and wife denied having had venereal disease.

The last menstruation occurred approximately eighteen weeks before admission to the hospital. Two weeks before admission there had been a moderate amount of uterine bleeding each day, usually in the form of clots. During the last three months of the period of amenorrhea the patient had suffered from a constant dull pain in the lower abdomen and pelvis, especially in the left side. At times the pain became sharp and radiated toward the rectum. There was, however, no one attack more severe than the others. For several weeks there had been colostrum in the breasts and a noticeable enlargement in the lower portion of the abdomen. The general health of the patient had been only slightly impaired.

Physical examination negative. The breasts were well developed and contained a large amount of colostrum. The abdominal muscles were relaxed over the upper one-half of the wall but slightly rigid below the umbilicus, with marked tenderness, especially over a semisolid, irregularly-shaped mass which filled the greater portion of the lower abdomen and extended to the level of the umbilicus. Nothing abnormal could be discovered in the upper abdomen. There was no sign of hernia.

The pelvic floor was intact and its function normal. The vaginal walls were intact. The cervix which was normal in appearance was displaced downward, for-

The clinical case reports at this meeting were contributed by members of the attending staff of the Woman's Hospital.

ward and to the right by the pelvie mass. Its canal was slightly more patent than normal and the internal os was open. A moderate amount of blood from the uterine body came through the canal.

The uterus, which was very slightly enlarged, was displaced to the right, upward and forward by the pelvic mass, and fixed. The uterine appendages could not be palpated because of the semisolid tender mass which almost filled the remainder of the pelvic cavity, and was continuous with the mass which could be palpated through the abdominal wall.

A diagnosis of ectopic gestation was made and operation decided upon. Drs. Bissell and Rawls, who saw the case in consultation agreed with the diagnosis.

The abdomen was opened by a midline incision extending from symphysis to umbilicus. The pelvis and lower abdomen were filled by a semisolid asymetrical, immobile mass, obscured from view by the adherent omentum. Upon separating the omentum the slightly enlarged uterus was found fixed in the right side of the pelvis by the mass. Several loops of ilium, the rectum, and sigmoid, were attached to the mass by recently formed adhesions. Both tubes entered and were incorporated in the mass, as was the left ovary. The right ovary was adherent to the broad ligament but was otherwise normal. In the right iliae fossa there was an embryo 8.5 cm. in length attached to a small umbilical cord which disappeared in the pelvic mass. To the dorsal region of the embryo a loop of ilium was adherent. There was no sign of the fetal sac. Following the removal of the embryo an effort was made to separate the adhesions between the mass and intestines but was abandoned because of the profuse bleeding and the inevitable damage to the bowel which would have resulted. Because of the rather free oozing from the peritoneal surface from which the embryo was separated, and from the peritoneum in the left iliac region to which the omentum had been attached, a cigarette drain was placed in each iliae fossa and carried through the lower angle of the abdominal incision. It is to be noted that no drain was placed in the true pelvis. Because of the density of the adhesions and the impossibility of separating them, the attachment of the embryo could not be determined. The abdomen was closed in layers by nonabsorbable material.

The recovery was uneventful. The highest postoperative temperature was 102° on the first day and was normal by the fourth day. The highest pulse rate was 112 on the first day and normal on the fourth day. Respiratory rate, 24 on the first day and normal on the fourth day. The drains were slowly removed, and the wound healed by primary union excepting at the drainage site. The patient was discharged 35 days after admission, having been detained until the abdominal incision was completely healed. The pelvic mass was markedly reduced in size. Symptoms, with the exception of slight, occasional pelvic pain, had disappeared.

Since July 30, 1927, the day of discharge from the hospital, the patient has been examined twice. Symptoms, with the exception of occasional dull pain in the left lower quadrant of the abdomen, have disappeared. Menstruation is normal. The general health of the patient is good. The uterus is now slightly enlarged, but otherwise normal. The pelvic mass has gradually diminished in size so that at the present time it consists of a slight thickening of the left appendages. Nothing abnormal can be palpated in the right side of the pelvis or culdesac. In all probability operation will not be necessary.

Comment.—Unfortunately this case of abdominal pregnancy cannot be accurately classified as to type because of the impossibility of locating the placental attachment at the time of operation. It had its beginning, in all probability, in the left uterine tube and later became abdominal. Because of the absence of a history of any intrapelvic catastrophy early in the pregnancy, one is inclined to believe that the ovum may have been aborted by the tube rather than to have reached the ab-

domen through a rupture of the tube wall. The size of the fetus seems to indicate that in all probability it survived until the end of the fourth month of gestation.

# Dr. A. H. Aldridge described an instance of Menstruation into the Bladder from a Vesicovaginal Fistula Due to Childbirth Injury.

M. W., a poorly nourished negress, single, twenty-nine years of age, was admitted to the Woman's Hospital on July 22, 1926, complaining of incontinence of urine since her labor at nineteen years of age. She denied having had any previous serious illness or operation. Her menstrual periods were always regular and normal until the time of her confinement. After the delivery the periods were still regular but she stated that when she menstruated the urine was stained with blood for the usual period of three days and then that she continued to pass white flaky material in the urine for a few more days. She had a menstrual period twelve days before admission to the hospital.

Although she weighed only ninety-seven pounds and appeared to be poorly nourished, her general physical examination was essentially negative. Examinations of the blood and urine were normal. The blood Wassermann was negative,

When her labor began, a midwife who was called to attend her stayed only a short time and advised that she be called later when the pains were more severe. She did not call the midwife again for sixty-eight hours after the time when she thought that the labor began. In the meantime she was not comfortable but had been up and about. She stated that she had practically no pain and called the midwife at the time of delivery because the baby's head appeared. The baby was spontaneously stillborn soon after the midwife arrived. No instruments were used for the delivery. She had no anesthesia during her confinement and seemed to be very positive about the details regarding it. She claimed that she had only slight discomfort during the labor and delivery. She did not know the weight of the baby but thought it was about the usual size for a newborn baby.

In view of the history her pelvic measurements are interesting, and as follows: between the spines, 26 cm.; between the crests, 29 cm.; right oblique, 21.5 cm.; left oblique, 21.5 cm.; external conjugate, 15 cm.; depth of symphysis, 6 cm.; transverse diameter of outlet, 7.5 cm.

She claimed that she had lost urine from the time that the delivery was completed until admission to the hospital ten years later. The convalescence was otherwise apparently normal with nothing in the history pointing to a postpartum infection. She was up and about ten days after delivery.

For nine years after delivery she was able to retain a small amount of urine and to void occasionally in the normal way. However, for one year prior to admission she had had total urinary incontinence.

She was kept under observation in the hospital for several days before any operative work was attempted.

Bimanual examination revealed a small retroverted uterus which was somewhat movable but could not be replaced. The tubes and ovaries seemed to be normal to palpation. Inspection of the vagina showed an irregular linear scar running diagonally across the vault toward the left side of the anterior wall. At the anterior left end of this scar there was an elliptical-shaped opening about one-half centimeter in length from which urine was constantly escaping into the vagina. This opening was on the anterior wall about two centimeters from the apex of the vault and one centimeter to the left of the midline. There was considerable fixa-

tion of tissues in the vault of the vagina about the sear described above. In the center of the sear there was a small dimple which was at first thought to be the external os of the cervical canal. Numerous attempts to pass a small probe through the opening were unsuccessful.

It was then decided to examine the bladder through the cystoscope to determine to what extent the injury had involved the base of the bladder and to decide whether there would be danger of injury to the ureteral orifices in closing the vesicovaginal fistula. On account of the fistula it was difficult sufficiently to distend the bladder in order to get a satisfactory inspection of its interior. The patient was so extremely nervous and sensitive that the examination was finally carried out under parasacral anesthesia. It showed clearly the ureteral orifices which were normal in position and uninvolved by the injury. It also showed the vesicovaginal fistula and in the center of the triangular area between the ureteral orifices and the fistula another depression was noted, believed at first to be a diverticulum of the bladder. We were surprised to find that a ureteral catheter could easily be passed into this depression for a distance of six centimeters.

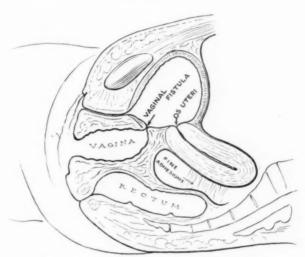


Fig. 1.—Showing relation of cervix to bladder.

We then believed that this was the external os of the cervical canal. In other words it seemed certain that there had been a childbirth injury which had left an opening through the vault of the vagina into the bladder and that as the uterus had involuted following delivery it had retroverted thereby rotating the cervix through the opening into the bladder. The injured area had then healed sufficiently to enclose the external os of the cervix in the bladder. Furthermore the healing of the injury was not quite complete so that a vesicovaginal fistula resulted at its anterior end.

To prove this theory operation was delayed until the patient menstruated, when she was again cystoscoped. Bloody fluid was then seen escaping from the depression in the base of the bladder. (Fig. 1.)

The surgical problem which presented itself was therefore twofold: First, to stop the menstruation in the bladder; and second, to close the vesicovaginal fistula.

There was much dense sear in the vault of the vagina about the cervix and the external os of the cervical canal had been found very near the ureteral orifices.

It was believed that an attempt to dissect the cervix away from the base of the bladder might result in an injury to the base of the bladder or ureters which would be very difficult to repair. It was therefore decided to do a supravaginal hysterectomy first, removing as much of the cervix as possible and later to close the vesicovaginal fistula.

It was considered unwise to close the vesicovaginal fistula first as it was feared that an infection of the uterus and pelvic structures might result from inadequate bladder drainage. The condition had been long standing and the bladder tone was sure to be poor. It was believed that under the circumstances any stagnation in the bladder would predispose to infection of the pelvic organs.

This procedure was followed. At operation the uterus was found retroverted and adherent to the peritoneum of the pelvis. The left ovary was cystic. A supravaginal hysterectomy was done and the left ovary was resected. Fourteen days later the vesicovaginal fistula was closed by the Sims method using interrupted silver wire sutures which were left in for fourteen days. A Sims block tin retention catheter was left in the urethra for seventeen days. The patient was discharged from the hospital twenty-one days after the second operation.

She was seen and examined at two months and again at six months after she left the hospital. The condition was satisfactory both anatomically and functionally.

# Dr. H. R. Mixsell described an instance of Congenital Atresia of the Esophagus with Tracheal-Esophageal Fistula.

A baby born, November 30, 1927, after a low forceps delivery, at term. Birth weight, 6.5. The child was apparently normal, the only symptom noted was anorexia and persistent meconium stools. On December 5, the baby vomited immediately after every feeding, the vomiting being nonprojectile in character. Examination on that day showed a markedly dehydrated infant weighing 5.4 (a loss of 17 ounces in five days). No reverse peristalsis seen. A congenital anomaly, either stricture of esophagus or atresia of duodenum, was assumed to be present. The roentgen examination showed a complete atresia of the esophagus.

Death followed on December 7 on the eighth day. The autopsy showed a normal baby except for the following: 5 cm. from the epiglottis the esophagus ended blindly and deviates slightly towards the right. The diameter of the upper portion of the esophagus is 1 cm. Cardia normal. A probe inserted into the lower end of the esophagus passes upwards without resistance until the point hits the base of the skull. The upper end of the probe passes through the larynx. The lower end of the esophagus is dilated (on account of barium x-ray). Corresponding to the lower end of the blind upper portion of this esophagus an ovoid fistula (1 cm. long) is seen in the posterior wall of the trachea, its lower edge being 4 :nm. above the blind end of the upper part; the edges are sharp and the opening seems to be situated only in the membranous part. The axis of the esophagus and that of the trachea are nearly mathematically the same. The lower half of the fistula corresponds to the bifurcation and is 7 cm. above the cardia (Fig. 1).

A very eareful search of the entire body with exception of the skull did not reveal any other anomaly. This is the more astonishing since the malformation in question must have been there at a stage when the whole fetus was not longer than 4 or 5 mm.

Dr. Mixsell had only seen one other ease like it in four years experience at the Woman's Hospital and that child also lived about eight days.

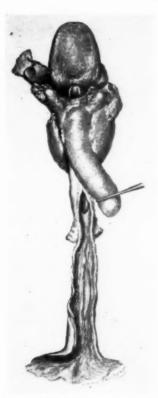


Fig. 1.—Esophago-tracheal fistula.

# Dr. Ralph L. Barrett reported a case of Intrapartum Hemorrhage from a Ruptured Varicosity in the Vault of the Vagina.

The alarming character of the hemorrhage together with the difficulty of differential diagnosis and the rarity of case reports of this condition warrant the presentation.

Mrs. B. E., aged thirty-five, married six years. She had had one previous pregnancy, one year ago, which resulted in a spontaneous abortion at the eighth week. There were no complications at that time and no curettage was done. The patient was a well nourished, athletic type of woman, 5 feet, 8 inches in height, weighing 145 pounds at the beginning of her pregnancy, and 175 pounds at term. Physical examination was normal, and the pelvic measurements were adequate. There were no external varicosities. During her pregnancy she had been under the usual antepartum observation. Her blood pressure and urinary findings were normal throughout pregnancy until the thirty-eighth week. Her pregnancy was uneventful until the beginning of the thirty-ninth week, when for the first time she showed some edema of the feet with a faint trace of albumin in the urine, also a rise of blood pressure to 130/74. She was placed on a diet of carbohydrates and green vegetables, with a limited amount of milk and no added salt. She was also given one ounce of Epsom Salts each morning and put to bed.

Three days later, August 22, 1926, her blood pressure was 152/90 and the urine showed a heavy trace of albumin, and for the first time, the urine sediment showed

an occasional hyaline cast. Her complexion was pasty in appearance and she complained of mild headaches. There was some edema of the face and hands. She was admitted to the Woman's Hospital on this date.

In the hospital she was put at absolute rest in bed and was given high colonic irrigations of soda bicarbonate twice in twenty-four hours. Her diet was limited to milk and water. On the next day, August 23, 1926, she complained of severe headache and epigastric pain. The edema of the feet was less, but it was more marked in the face. The blood pressure was 170/110, the urine boiled solid and contained 20 grams of albumin per liter. She had no visual disturbances and the eye-grounds appeared normal. It was evident that toxemia was advancing rapidly in spite of dietary and eliminative treatment. The patient seemed to be nearing the eclamptic state.

At 6 P.M., August 23, 1926, under light gas and ether anesthesia an extraovular insertion of a No. 4 Voorhees bag was made in the lower uterine segment. The



Fig. 1.-Showing site of ruptured varicose vein in vaginal vault.

membranes were not ruptured. At this time the cervix was soft, about 3 cm. dilated. The baby was presenting by the vertex, in the R. O. A. position, there was no engagement. The fetal heart was 148. Uterine contractions began about one hour later and by 8:30 they were regular, at five minute intervals, and labor seemed to be progressing satisfactorily. About three hours after the insertion of the Voorhees bag there was sudden, fairly free, bright colored vaginal bleeding; this continued without apparent change. The uterine contractions continued at three to five minute intervals and seemed normal in character. There was no change in the fetal heart rate.

The source of the bleeding was unknown. Placenta previa was considered, also bleeding from premature separation of the placenta or from laceration of the cervix due to its dilatation by the bag. By 10:30 P.M. the bleeding seemed to be increasing and there had been an estimated loss of 600 c.c. of blood. At this time the maternal pulse had increased from 72 to 98, and the blood pressure was 160/90. The patient was taken to the delivery room, and a careful exploration made under gas and ether

anesthesia. There was a constant trickle of fresh blood from the vagina. The Voorhees bag was found to be in place in the lower uterine segments, and the cervix now dilated about 5 cm.

About one-third of the bag was protruding through the cervix. The bag was removed but no blood was found in the lower uterine segment and there were no clots. The membranes were intact and no placenta could be palpated. The vertex was presenting in the R. O. A. position at the brim. Further search revealed a large, dilated varicose vein high up on the posterior vaginal wall just to the left and posterior to the cervix. This vein was ruptured and was the source of the free bleeding. Attempts to suture the vein were unsuccessful and after replacing the Voorhees bag in the lower uterine segment the whole vagina was tightly packed with two-inch iodoform gauze. The bleeding was controlled in this manner and labor continued through the night. At 6:30 the next morning there was some protrusion of the gauze from the vagina and again fresh vaginal bleeding. The vaginal packing was removed and the vagina again repacked with iodoform gauze. This controlled the bleeding. The blood pressure at this time was 160/90 and the maternal pulse 110; fetal heart 152.

About 2 P.M., August 24, there was a rather free discharge of watery, blood-tinged fluid, apparently from rupture of the membranes. One hour later the vaginal packing and bag were partially expelled and were removed from the vagina. There was no further bleeding at this time. Strong uterine contractions continued at two to three minute intervals for the next two hours, with failure of labor to progress beyond 8 cm. dilatation of the cervix. The vertex was still at the brim in the R. O. A. position. The mother was becoming exhausted, her temperature was now 100° and her pulse 112. The fetal heart was irregular and there was a discharge of meconium from the vagina.

Under gas and ether anesthesia the remaining rim of cervix was dilated manually and a rather difficult internal podalic version and a breech extraction were done, with the delivery of a living female child weighing 8 pounds, 9 ounces. Immediately following delivery there was considerable fresh bleeding. Manual extraction of the placenta was done at once and a tight tamponade of the uterus and vagina was made with two-inch iodoform gauze. A moderate second degree laceration was repaired with chromic catgut. Two hours after delivery the maternal pulse rate was 118 and the blood pressure was 160/100. There was no further bleeding. The blood count two days later showed a hemoglobin of 50 per cent, red blood cells 2,324,000, white blood cells 22,600, polys 82 per cent, lymphs 18 per cent. The antepartum blood count on the day of admission to the hospital showed hemoglobin of 73 per cent, red blood cells 4,080,000, white blood cells of 8,800. The uterine and vaginal packing was removed on the third day and there was no further bleeding during her puerperium.

The mother and baby made an uneventful recovery. They were discharged from the hospital on the twenty-sixth day. At that time the mother's blood pressure was 125/75, the urinary output was normal and contained only a very faint trace of albumin, too small for quantitative determination. Phenolsulphonephthalein test showed 55 per cent elimination in two hours. Her blood count showed a hemoglobin of 60 per cent, red blood cells 3,280,000, white blood cells 10,000. At the end of three months the urine was entirely normal, her blood pressure was 120/65, she had a hemoglobin of 80 per cent and the red blood cells were 4,200,000.

A search of the literature in reference to this complication has revealed only three reported cases of hemorrhage from ruptured varicose veins of the vagina.

Aitken in the British Medical Journal for 1922, reports a case of rupture of varicose veins high on the anterior vaginal wall. This occurred two days before

the onset of labor and caused an infiltration of the vaginal wall with severe hemorrhage, controlled only by vaginal packing with pressure against the pubic bone.

Kaufman in Döderlein's Handbuch der Geburtshülfe, 1925, reports a case of hematoma of the vagina originated from ruptured varicosities.

Cecil, in Louisville Medical Monthly, 1895-96, describes a case of ruptured varicose veins high in the vagina, at the onset of labor and the bleeding simulated placenta previa or accidental hemorrhage.

In the case reported there was difficulty of exact diagnosis until careful search had been made under anesthesia, and the ruptured vessels had been visualized. The bleeding was similar to that which occurs from lacerations of the cervix incident to dilatation. The differential diagnosis from placenta previa or from premature separation of the placenta was definitely made only after careful examination and inspection under anesthesia. The important feature of the case is the fact that dangerous hemorrhage may occur during labor from rupture of varicose veins in the upper vagina. The increased pelvic congestion and stretching incident to pregnancy and labor is probably the etiologic factor in the rupture of the distended veins, which in this case were superficial and thin-walled. DeLee believes that there are degenerative changes in the vessel wall due to a toxemia of pregnancy.

# Dr. Edward C. Lyon, Jr., reported a case of Fatal Postpartum Hemorrhage from a Ruptured Varicosity in the Culdesac of Douglas.

Mrs. B., twenty-five years of age, a primigravida, was admitted to the Prenatal Clinic, March 25, 1927, at about the fifth month of pregnancy (expected labor August 9, 1927). The routine examination, at this time, showed measurements within normal limits, the fundus 2 cm. above umbilicus, and the fetal heart not heard. The right appendage was enlarged and tender, the blood pressure and urine were normal and the Wassermann was negative. This patient made ten subsequent visits to the Prenatal Clinic, during which time the blood pressure and urine remained normal and her general condition good.

She was admitted at 10:35 A.M., July 25, 1927, two hours after the onset of labor. The first stage was normal, lasting four hours and thirty minutes, during which time the contractions were strong and effectual. The second stage was one hour and fifty minutes, with strong frequent contractions, and it terminated in a spontaneous delivery without complication or laceration. The baby was in good condition, weighed six pounds and nine ounces and measured 48 cm. long. The third stage was six minutes. The placenta was intact and expelled spontaneously with the membranes complete. The uterus contracted well, without undue bleeding and no unusual handling of the fundus occurred. One c.c. of a standard pituitary extract was given hypodermically immediately after the birth of the baby and one c.c. of an ergot preparation, also by hypodermic, after the delivery of the placenta. The patient was sent to the ward in good condition.

The delivery of this patient was at 2:20 p.m., July 25, and at 4 p.m. her temperature was 100.4°, pulse 76 and respirations 20. She was seen by the resident obstetrician at 7 p.m. and found to be in good condition. At midnight her temperature was 100.2°, pulse 80, and respirations 20. Then at 3:15 a.m., the nurse heard the patient groaning as if in pain. Her pulse was weak, extremities cold and she complained of some pain in the chest and slight pain in the lower abdomen. She was seen immediately by one of the intern staff and found to be in marked shock, with no external bleeding. Routine measures for shock were instituted, and the Resident, who came up at once, found her in a critical condition which became rapidly worse. The patient died in shock at 4:35 a.m. one and one quarter hours after the nurse

noticed a change in her condition. Those who saw this patient were at a loss to say what was the cause of the shock and as a result this became a coroner's case, The autopsy was performed by Dr. Gonzales and the findings follow:

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Uterus.—Large; walls very thick; with a large subscrous fibroid about the size of an orange, pedunculated, at the fundus. There are a number of intramural fibroids also. Internal ring natural; there is some clotted blood attached to the uterine mucous membrane. In the culdesac on the left side is a small rip in the peritoneum showing a dilated vein which had ruptured. Ovaries: Right ovary shows a corpus luteum with the usual luteum cells; tubes and the other ovary natural.

Anatomical Diagnosis.—Hemorrhage into abdominal cavity from ruptured dilated vein of the pelvis. Uterine fibroid both subserous and intramuscular. Edema of organs. Acute vegetative mitral valvulitis. Cause of Death: Hemorrhage into abdominal cavity following rupture of a varicose vein in the culdesac of Douglas during delivery, full term, natural; contributory: uterine fibroid.

In discussing such a case, several questions at once arise, chief of which are: when did this rupture occur? And how could it have been avoided? It is most natural to assume that this vein ruptured during the labor or delivery. Yet if it did occur then, is it probable that bleeding would continue for so long a period of time, twelve hours, and the patient retain a normal pulse and show no symptoms? If the rupture occurred at the time the patient complained of pain, such an explanation would fit in with the sudden onset of shock but would be hard to understand with no manipulation or possible trauma occurring at this time. Undoubtedly many explanations might be offered, though with the data at hand they must be only conjecture. As for preventing such an accident, really nothing can be done, because of the impossibility of diagnosing thin walled varieosities or determining whether they are situated at points of special stress or strain. The fibroids were not recognized antepartum or postpartum, but even assuming they were responsible in part for the varicosity, one cannot say that a knowledge of their presence would have altered the handling of the case or caused one to apprehend the rupture of a pelvic vein. Naturally one always thinks of hemorrhage in cases of sudden shock, and one always should, yet here, with no external bleeding, a contracted uterus, and a persistently slow pulse, the possibility of an intraabdominal hemorrhage did not seem important. Fortunately, such an accident as occurred in this case is extremely rare. Doederlein in his Handbuch d. Geburtshulfe quotes six cases, which he collected from the literature, of death from rupture of varicosities within the abdomen during pregnancy or delivery. A review of the American and English textbooks on Obstetrics adds no more cases, though DeLee and E. P. Davis mention such a possibility.

#### DISCUSSION

DR. A. B. DAVIS wanted to emphasize the fact that in every case he had seen there has been acute abdominal tenderness.

DR. DOUGAL BISSELL said that the case reported by Dr. Aldridge is one not commonly met with today but was not uncommonly encountered in the days of Sims and Emmet. Today we find retroversion following labor in about twenty per cent of cases. In the day of Sims it was much greater because of poor obstetries. Under these circumstances it would seem extensive injury to the anterior vaginal wall was not at all infrequent. With such an injury, or one as large as the cervix itself, it is perfectly logical when a uterus assumes, in its process of involution, a retroverted position, that the cervix should move anteriorly, pass

through the opening into the bladder and be caught and anchored there in the healing process of the injured vaginal and bladder walls.

DR. W. P. HEALY commented on Dr. Aldridge's statement to the effect that supravaginal hysterectomy was deemed desirable because of the risks of infection into the uterus and tubes if the uterus were left in place, and the menstrual flow had to go through the bladder. Dr. Healy observed such a case, in which there had been a congenital absence of a portion of the vagina, and when the young woman reached the age of puberty and the menstrual cycle established itself and did not appear externally, a surgeon did an abdominal operation, and whether intentionally or accidentally he connected up the cervix with the bladder. The patient did not come under Dr. Healy's observation until after she had married and had conceived as a result of intercourse through the urethra and she had a dead fetus in the uterus. Her surgeon then in charge thought she had an ectopic pregnancy and did an abdominal operation and removed the fetus from the uterus, The anatomic arrangement in the pelvis was evidently very confusing to him. He was satisfied to get rid of the fetus and the placenta and did not do a hysterectomy. She came under observation after that operation. At this time she was suffering a good deal from vesical incontinence as the result of all the examinations that had been made through the urethra, and she had, of course, a very marked cystitis. After a conference with her and her husband it was agreed that they did not want the uterus removed. Dr. Healy advised supravaginal hysterectomy, as the method of terminating the menstrual flow through the bladder, but that was declined. They wanted to have the incontinence treated, which was a difficult problem unless the husband would agree that he would not interfere later with any operative procedure which was carried out. Dr. Healy then operated for the incontinence, resecting a large portion of the posterior urethral wall from the orifice up to the bladder and reconstructing a little more vaginal canal. It is interesting to note that the operative result on the incontinence has been satisfactory. At present this patient is menstruating through her bladder and has urinary control.

### Dr. Geo. W. Kosmak reported a case of Fetal Death Due to Intrauterine Rupture of a Velamentous Cord.

It was the second one in his experience. The patient, aged thirty-five, had been married seven years, with one induced miscarriage five years ago. Her menstrual history was regular, the periods being profuse and marked by cramps for two days. Her last period began December 10, 1926, and the end of her pregnancy was expected about September 16, 1927. She had marked nausea and vomiting in the early months and was very constipated. She believed that she felt life about April 14.

She gave a history of having had an attack of Dengue fever three years ago and had resided in Cuba for the last four years, and before that in the Argentine. There was no malarial history. Patient was a slight, moderately well nourished woman, weighing 109 pounds, with a low blood pressure and aside from a slight puffiness of both ankles presented nothing abnormal throughout her pregnancy.

After a strenuous day of shopping, etc., on September 8, she developed irregular abdominal pains and a sudden rupture of watery bright red fluid on the following morning. Examination about two hours later after admission to the Woman's Hospital showed the head well engaged; cervix thin, two fingers dilated with a slight bloody discharge present. A considerable number of firm clots had been previously passed. There were no fetal movements or heart sounds and the patient stated that she had not felt the baby during the previous day. General condition good, pulse

about 90, respirations normal, color as usual. A tentative diagnosis of premature separation of the placenta was made although there were none of the accepted signs present, such as pain, uterine rigidity or tenderness, board-like abdomen or

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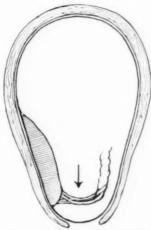


Fig. 1.—Diagram showing situation of placenta and velamentous cord.



Fig. 2.—Showing laceration in a velamentous cord attachment.

constitutional evidences of hemorrhage. Dr. Kosmak considered the possibility of a ruptured velamentous cord from his previous experience but in view of the patient's general good condition no interference was attempted as the baby was believed to be dead. Strong regular pains continued throughout the day and after the head

reached the level of the spines no further progress resulted. An easy forceps extraction was done under gas-oxygen ether anesthesia and a well nourished dead baby, weighing 6 pounds was extracted, which showed no evidences of life. A moderate amount of dark blood followed the delivery of the child and the placenta was expressed without difficulty about a half-hour later by slight Credé. Examination of the secundines disclosed the condition shown in Fig. 1. The attachment of the placenta was evidently low down in the uterus as the rupture of the membranes occurred near the edge (Fig. 2). The maternal surface of the placenta was normal, there were no retroplacental clots and only a slight degree of fibroid and fatty degeneration, with no evidences of infarets. The patient blcd only about 30 e.c. and was returned to bed in good condition and made an uninterrupted recovery.

A previous instance of this unfortunate complication of labor was reported by Dr. Kosmak in the American Journal of Obstetrics and Gynecology (Vol IV, p. 19). In the latter case a diagnosis of premature separation of the placenta associated with a uterine fibroid indicated a cesarean section, during which the true condition was discovered.

Dr. J. R. Goodall, of Montreal, presented a paper (by invitation) entitled **Cervical Infections in the Puerperium**. (For original article see page 339.)

#### DISCUSSION

DR. BYRON GOFF said he was disappointed at the doctor's failure to touch upon an extremely important phase of the subject, namely, immediate repair of the lacerated cervix as a possible means of presenting cervical infections in the puerperium. It is a generally accepted fact that the lacerated cervix is more likely to become infected during the puerperium than the cervix which has escaped injury. It would seem logical, therefore, to repair the lacerated cervix at the termination of the third stage of labor, and, thereby, prevent many such infections.

About three years ago Dr. Goff became interested in immediate cervical repair, largely through reading of the work of Dr. E. P. Davis, Dr. DeLee, and Dr. Ludwig Emge, and began routine examination of the cervix immediately after the third stage of labor in primiparae with the idea of repairing significant injuries. His first efforts were directed toward learning the appearance of the normal and the lacerated cervix. For a period of six months he examined the cervix of each primipara and made notes on the condition found. The notes were checked against the findings at the end of the second week and the second month postpartum. When satisfied that he could detect a cervical injury with certainty, he made an attempt at primary repair.

During the past two and a half years Dr. Goff examined in private practice the cervices of approximately 200 primiparae at the termination of the third stage of labor and learned the following facts: (1) The individual who does not make a practice of examining the cervix routinely at the end of the third stage of labor is unable to differentiate between the normal and the lacerated cervix. (2) Approximately 40 per cent of cervices in primiparae have significant injuries. (3) Immediate repair of the cervix is feasible. It is, however, not an easy operation. (4) The operation should not be attempted by anyone who cannot perform the usual plastic operations on the cervix and vaginal walls. (5) The procedure should be attempted only in a well equipped operating room where at least one good assistant and an anesthetist are available. (6) The method of repair is important. The type of suture used in the usual trachelorrhaphy gave poor results. The mattress suture as suggested by Emge gave very satisfactory results. (7) Faulty

union will occur in a very small percentage of cervices which have been properly repaired. (8) The end results which follow immediate repair of the cervix are very encouraging. Cervices which have healed well are normal in size and in a very small percentage of cases is infection present. (9) When the standard of The American College of Surgeons is applied, the puerperal morbidity in cases subjected to immediate repair of the cervix should not be any higher than in cases in which vaginal injuries have been repaired.

DR. WILBUR WARD said that out of the mass of facts Dr. Goodall has given there are two or three things which stand out.

The first is about the cervix at the termination of the third stage. The cervix at the end of the third stage of labor is edematous, it is everted, it is eroded, it is lacerated in 100 per cent of cases, and this is to be expected, considering what has happened in the previous few hours.

This leads to the next thing, namely, the question of infection of that eroded, lacerated, edematous, hypertrophic tissue with the organisms which are always intrinsically present. In other words, it is always infected, and we naturally expect a certain number of reactions from the infection of that cervix.

The third thing is the question of morbidity. A pregnant woman who goes through an ordeal, serious in a great many cases, in any case a physical strain, with contusion, laceration, hemorrhage must show some normal reaction. Therefore he did not agree at all with Dr. Goodall's morbidity range. No surgeon expects to take out an interval appendix under the most favorable circumstances and not have a reaction from absorption of catgut, of blood-clots, dead cells, etc. It is a normal, natural thing. Why should we expect to take a surgical proposition, which labor is, and not have a reasonable reaction without calling it a morbidity? In other words, he believed Dr. Goodall had taken too high a standard for his range of morbidity.

DR. G. W. KOSMAK felt that this is assuming greater importance every day in our obstetric treatment.

There is one phase that he would like to comment on particularly; namely, the treatment of the infected cervix during pregnancy. Dr. Ward has just said that that is still undecided. Dr. Kosmak had not decided it in his own mind, but nevertheless he was trying out in private cases the results of active treatment of the infected cervix during pregnancy. He said that he believed it to be the duty of the obstetrician to pay more attention to the cervix during pregnancy than he has in the past. In the antepartum examinations of the patient we should pay closer attention to her statement about vaginal discharges and in every case we should make a routine examination of the cervix with the aid of the speculum, not only in multiparae, but also in primiparae. He was rather astounded in examining young women at the fifth and sixth month of pregnancy, who complain of annoying discharges, to find the cervix very much congested, frequently hypertrophied to two and three times normal size, with rather extensive areas of erosion that bleed as soon as they are touched with the sponge. Again in cases earlier in pregnancy that complained of bleeding, showed that this bleeding did not proceed from the uterus, that it was not an evidence of an impending miscarriage, but that it came from an eroded and extensively ulcerated cervix.

The question is what to do with these cases. Does the presence of an infected eervix of this kind during pregnancy, even in multiparae, contribute something to the marked endocervicitis which we see so often during our examinations after labor? Dr. Kosmak believed it does, although not prepared to qualify that statement by actual statistics as yet. Those patients in whom he succeeded in keeping the condition more or less in check, even if he could not cure it, seemed to go

through a fairly normal puerperium without any elevation of temperature, and in whom after delivery the cervix was found not in as bad a condition as in a great many multiparous patients who came with cervices that were already lacerated and diseased. Dr. Kosmak believed that these infections went back to early childhood. We find a great many little girls who develop vulvitis, subsequently a vaginitis, and in whom the process is a long drawn out one that is very resistant to treatment. Possibly this infection extends inward and reaches the cervix, to be lighted up, even years later when the girl is married and becomes pregnant.

Again, I believe that many men have been negligent in their postpartum examinations, and I have been rather astounded in questioning patients that in many instances where I have found markedly infected and diseased cervices that patients have been discharged by their obstetrician without a satisfactory examination of the cervix with the speculum. Now, the ordinary bimanual examination tells us nothing. We feel possibly a lacerated cervix, but we pay very little more attention to it, and, in fact, we cannot understand the true condition present unless we actually insert a speculum and get a look at the cervix.

I think Dr. Goodall has very wisely drawn our attention again as many others have done, to the importance of the cervix in pregnancy and in the puerperium, and I believe that this lesson should be engrafted to such an extent that every one of us will go away from here with the intention to inspect the cervix during pregnancy and after pregnancy more often than we have in the past.

DR. H. B. MATTHEWS said he wanted to call attention to the marked reduction in morbidity by the proper use of 4 per cent mercurochrome at the Methodist Episcopal Hospital, as a vaginal and cervical germicide. Furthermore if a comparison is made of the morbidity from the standpoint of operative and spontaneous deliveries where mercurochrome was used it may be noted that beginning with a morbidity of 9.1 per cent for operative cases and one of 4.7 per cent for spontaneous cases, on the first Obstetrical Service, this had been reduced to a morbidity of 8.3 per cent for operative cases and one of 2.3 per cent for the spontaneous cases on the Second Obstetrical service.

The doctor showed other slides demonstrating the morbidity for the different operative procedures, such as version, placenta previa, high forceps, induction of labor and median episiotomy, with a morbidity of 4.1 per cent for the induction cases.

Following the exhibition of the slides, Dr. Matthews said the first point he would like to make was the efficacy of properly applied, mercurochrome as a vaginal and cervical antiseptic. Of course, in the secondary intrinsic infections in the old lacerated cervix where the infection is deep scated the germicide does not act so efficaciously as it does in the primiparous cervix where there is little or no previous infection. It does seem, however, that by more or less rendering aseptic the vaginal area we do minimize infections of the cervix.

The second point he had in mind was the immediate repair of both primary and secondary lacerations of the cervix, which should be more universally practised in hospital obstetrics.

The third point was that at the Methodist Episcopal Hospital, due to persistence of Dr. Mayes, we have developed a technic for the use of 4 per cent mercurochrome as a vaginal antiseptic which has reduced the morbidity 50 per cent or 8.8 per cent for the last 5000 cases.

DR. B. P. WATSON said he agreed with the speaker when he deplores the placing of all the blame upon nurses and doctors for every morbidity in pregnancy. Many cases of infection, especially minor infections, are probably intrinsic in origin, but he questioned whether the real virulent puerperal infection originates

from intrinsic organisms. Our own recent experience is that these very virulent infections are introduced from without by some means or other. That, however, does not exclude what Dr. Goodall has contended; namely, that the minor infections are probably due to organisms that harbor in the cervix.

Some three years ago in Edinburgh, a research on the organismal content of the cervix in pregnant women was made by Dr. Jessie Eals, who found that 60 per cent of multipara had streptococci of some sort in the vagina. There was no evidence, however, to show that those organisms were pathogenic organisms; they may have been potentially pathogenic, but the patients in whom they were found did not show any higher rate of morbidity than the average in the hospital.

Not only are organisms found in every cervix three or four days after labor, but in every uterus and in the neighborhood of the uterus four or five days after labor, so that we must regard these organisms as practically normal habitants of the vagina and of the puerperal uterus. It is, therefore, a very moot question as to what proportion of cases of infection are due to organisms which are there before delivery and what proportion are due to organisms introduced from without.

DR. W. P. HEALY said that what interested him particularly is the association between infections, postpartum, and any subsequent malignant lesion in the cervix. He believes, however, that the use of mercurochrome or any other form of safe mechanical and mild antiseptic cleansing of the vagina and freeing of the vagina of latent secretions that cause cervical irritation during the puerperium are very important, and that we can with advantage encourage the earlier use of mechanical cleansing of the vagina postpartum than is ordinarily carried out. Dr. Healy had never had any hesitancy about recommending vaginal douches postpartum as soon as the patient began to have any kind of foul or odorous lochial discharge.

One of the more important causes of foul lochia is the retention of urine in the vagina. The patient always attempts to void lying on her back on a bed-pan, she invariably puts a certain amount of urine into the vaginal canal.

From the standpoint of infections of the type that Dr. Goodall refers to in their relation to cancer, it is more important to know the condition of the cervix in the weeks when the patient is on her feet and going about and able to go to the physician's office for observation and treatment for any cervical erosion or laceration, more important to know what is going on and to treat it then than it actually is in the first two weeks postpartum. We do not know, however, what association there is between infected cervices or lacerated cervices and cancer of the cervix, beyond the fact that the vast majority of cases of cancer of the cervix occurs in married women and, therefore, in cervices that have been subjected to damage, as Dr. Healy called attention to the rather infrequent occurrence of cancer of the cervix in women who have had badly infected cervices of the venereal type, but who have not conceived; in other words, chronic endocervicitis without laceration, of venereal origin, is not necessarily going to be associated with carcinoma in the cervix to any great extent. That is to say, carcinoma of the cervix in prostitutes seems to be a rather infrequent disease. Then, we know the racial differences, the infrequency of cancer of the cervix in the Jewish women and the great frequency of cancer of the cervix in Italian women, in both of which races the cervix is very frequently injured, as much in one as in the other from childbirth.

DR. GOODALL, in conclusion, said: "In regard to Dr. Goff's immediate repair of the cervix, I would say that we practice it in a goodly number of cases, but singularly there is a very large percentage of cases where the external os seems to have suffered very slightly and yet the cervical canal opens up beyond the internal os into quite a large cavity, wherein the infection lurks. Those of you

who have cauterized the cervix in numerous cases have met with these cases where the external os, even after labor, has reduced itself to a very small opening and beyond this, when you get in, there is a large cavity which leads eventually in a fusiform manner to the internal os; so repair of the cervix is not, shall we say, a panacea for this condition, though I quite readily understand it is a subject in which we will eventually, perhaps, be criticised in years to come for not having repaired cervices as today we are criticised for not having repaired the perineum.

"What Dr. Ward had to say about the reaction to labor is very interesting. The viewpoint which he expressed is one that appeals to one as rational, and yet Dr. Ward asks why should we not have a reaction after labor as well as after any other type of abdominal operation, for example, but it does not occur; that is the point. You can have multiparae and primiparae deliver themselves even with an episiotomy and with forceps and yet have an absolutely uneventful recovery without a fifth of a degree elevation in temperature."

Discussing further the question of morbidity following labor, Dr. Goodall referred to some studies that they had made which revealed the fact that in 60 per cent of the cases there was no morbidity, "not even a temperature above normal," that this was true of all types of cases, and stated that from the evidence which had been adduced by this particular survey, it was interesting to know why there should be morbidity in the other 40 per cent. Continuing along this line, the doctor said:

"After all, that is the clinical evidence; I cannot explain it, but it is a clinical fact, nevertheless.

"In regard to the treatment of the cervix during pregnancy, I think perhaps there is a field of activity there.

"I did not go fully into the subject of mercurochrome but if I had, it would read here that there is a very marked degree of lessened morbidity after its use, the stay of the patient in the hospital is lessened by a very considerable degree, and, altogether, the treatment is, I think, rational and certainly justifies the procedure.

"Dr. Vineberg spoke of a very important subject, namely: Does the hypertrophy which occurs in the uterus coincide with, or is it the result of fibrosis? In other words, is that similar to chronic metritis? No, it is not. Microscopically these two conditions can be differentiated absolutely. Every woman who has borne a child can be diagnosed, as can every woman who has had a pregnancy, by the microscopic sections of the uterine wall, whereas in the fibroid cases there is purely muscular and other tissue hypertrophy with no residuum of the former pregnancy.

"I quite agree with and I think I emphasized what Dr. Watson brought out; namely, that these infections are nearly all from organisms which have been latent in the woman for a long time and have become markedly attentuated. I quite agree with him also that any severe infection is extrinsic in character and therefore introduced."

## NEW ORLEANS GYNECOLOGICAL AND OBSTETRICAL SOCIETY

#### MEETING OF FEBRUARY 9, 1928

Dr. A. H. GLADDEN, Jr., read a paper on **Hemorrhagic Diseases of the Newborn**, with the report of a case successfully treated by the injection into the gluteal muscle of 10 c.c. of whole blood from the father.

#### Dr. P. Graffagnino reported a case of Ruptured Uterus.

Patient, E. P., a pregnant negress of forty-five, was admitted September 9, 1927 in a state of collapse to the Charity Hospital. In the admitting room a diagnosis of pregnancy, with probable eclampsia, was made. About four hours prior to admission, she was suddenly awakened by severe lancinating pains just below the umbilicus, immediately succeeded by profuse perspiration, a sensation of cold and great weakness. While being transferred to the hospital, a small amount of blood flowed from the vagina. Her menstrual periods were always regular and painless; she had had three previous pregnancies. The first and second pregnancies terminated in normal deliveries, but the third delivery (six years ago) was by cesarean section. The puerperium in each instance was without incident and practically afebrile.

The pelvic measurements were normal; no fetal movements were palpated, there was no dilatation of the cervix and no uterine contractions, with slight vaginal bleeding and soreness over the abdomen.

A urinalysis (catheterized specimen) showed no casts or marked albuminuria. A blood picture revealed secondary anemia with slight leucocytosis and relative neutrophils. At 7 A. M. there was a decided improvement in her condition (blood pressure 100/70), but this was of short duration. In the afternoon her condition became desperate. At 5 p. M., when I saw the patient she was in a state of extreme shock; her pulse was rapid and almost imperceptible. On examination the abdomen showed a fetus, almost full term, under the skin; evidently a diagnosis of ruptured uterus was made.

When sent to the operating room a little after 7 p. m., her temperature was 101°, pulse 140, respiration 32. Infusion was started before the anesthetic was given. At 7:30 p. m., seventeen hours and forty minutes after admission to the ward, the operation was started. Under ethylene anesthesia, through a midline incision, a dead male fetus of about eight months, and the placenta were rapidly extricated from the abdominal cavity. The uterus had ruptured in the line of the old scar, extending from the internal os through the fundus. Because of the poor condition of the patient, it was felt that a Porro operation would not be justifiable, so the uterus was sutured outside of the cavity and the skin, according to the method of Portes. Two cigarette drains were introduced in front of the uterus in the space of Retzius, and the patient was sent to the ward with the usual orders for combatting shock. The operation terminated at 7:55.

Five hundred c.c. of blood as transfusion and 500 c.c. of normal saline as infusion, were given while the operation was in progress. Before leaving the table the patient was also given 1 c.c. of pituitrin. Pulse was good throughout, rate 120 to 124; after operation 120.

Patient had a rather stormy time during the two weeks following operation. For thirteen days the temperature ranged from 100° to 102°. Pulse irregular at times. Some gastric disturbance. Wound infection. Repeated examination of urine showed albumin present, often just a trace; once red blood cells were seen.

Patient's improvement dated from the thirteenth day after the operation; afebrile from that time until date of discharge. On the fourteenth day she was given soft diet. On the ninth day a gauze drain was substituted for the cigarette drains. On the twenty-second day the wound showed nice healing. It continued to heal rapidly, and the uterus to diminish in size. October 20 she was allowed to sit up in a chair and the following day was up and about the ward. She was transferred to a rest ward and kept there some time after she might have been discharged, but with an excellent result in her general condition and a wound completely sealed.

#### BROOKLYN GYNECOLOGICAL SOCIETY

MEETING OF MARCH 2, 1928

Dr. Francis B. Doyle reported a case of Teratomas of the Ovary.

History of the Case.—Mrs. L. K., twenty-seven years of age, admitted to Greenpoint Hospital (service of Dr. C. A. Gordon) complaining of severe pain in right lower quadrant of abdomen with vomiting and prostration.



Fig. 1.—Cross-section reveals the typical anatomic structure of teratoma. Numerous closely set cysts are separated by bands of stroma. Focally cartilage is encountered.

Menses have been regular and painless, of twenty-eight-day type and one week's duration. Never had a miscarriage. Has had three children, two are alive, one died five hours after birth following forceps delivery. Nine months previous to admission had an attack of intense pain in right lower abdomen a few days after her menses. Since then has had a similar attack of more or less severity following each menstrual period. Two days before admission the seizure was more acute and violent, vomiting more frequently, with greater prostration and weakness, than any preceding one.



Fig. 2.—The cyst cavity is lined by ciliated epidermoid epithelium. The underlying stroma contains alveoli of salivary glands. The excretory ducts are also indicated.



Fig. 3.—Epidermoid epithelium, fat, and islands of cartilage are present, supported by mature stroma.

On abdominal examination a large tender globular mass was palpable in the right lower quadrant, but was not felt vaginally.

White cell count 9800. Polys. 88 per cent.

Abdomen opened through a median incision. The right ovary was a large cyst with two twists in its pedicle and tube. It was swollen and dark mahogany in color. It was removed and abdomen closed.

Recovery and convalescence were uneventful.

The specimen consisted of an ovarian eyst and attached tube.

The tumor was ovoid in shape 15 cm. long and 10 cm. in diameter. The surface was nodular, presenting numerous cysts of various sizes. On section, the specimen presented a solid tumor with multiple cyst formation. Microscopic examination showed a confused mixture of tissue growth. There were cysts lined with stratified squamous epithelium, and with columnar epithelium. There were many sebaceous glands, tubular glands, fat tissue, bundles of smooth muscle fibers, and cartilage. No malignant changes were seen.



Fig. 4.—Irregular gland spaces lined by ciliated epithelium are supported by embryonal connective tissue. An island of cartilage is encountered.

#### DISCUSSION

DR. CHARLES A. GORDON said that the practical point in this discussion is that while cystic tumors are nonmalignant these solid teratomas are essentially malignant. This tumor, it is stated, seems to possess no characteristics of malignancy, yet that fact was discovered in the laboratory some time later.

There seems to be a difference of opinion whether a complete operation should be done or not in cases of this type, but it seemed to him that a complete operation should be done upon all these solid teratomas of the ovary without waiting for the diagnosis from the laboratory as to whether malignancy is present or not.

DR. SAMUEL A. WOLFE said that the gross pathology of the teratoma is beautifully reproduced in this specimen, a series of small cystic cavities supported largely by embryonal connective tissue. The dermoid in contrast, present mature, fully-developed adult type of structures. For example, the skin in a dermoid is comparable to normal skin in any healthy individual. The connective tissue is comparable to the connective tissue in the organ. In the dermoid many of the tissues maintain and retain their adult character, while those of the teratoma are embryonal. It is because of this particular feature that teratoma of the ovary is, as a rule, associated with grave potentialities of malignancy. When these embryonal tissues undergo malignant degeneration we use the term blastomatous degeneration to indicate the malignant transformation of embryonal tissues. As a rule, we find that the mesodermal elements, the connective tissue element undergo malignancy rather than the ectodermal or entodermal derivatives.

Dr. Wolfe believed that in this particular tumor the embryonal elements, however, are only focally noted. The cartilage is well matured, the connective tissue and fat are well matured, and the endodermal derivatives are well differentiated, and we can practically trace the comparable organs from which those tissues are derived.

In this particular instance he considered that there will be no local recurrence or general metastasis.

Dr. Harold Bailey read a paper entitled **The Long Labor**. (For original article see page 324.)

#### DISCUSSION

DR. A. C. BECK said he disagreed with the speaker in regard to operative interference and the use of morphine. A few years ago he studied the same subject very carefully, both as to etiology and treatment. The occipito-posterior cases had longer labors than did the occipito-anteriors. Contrary to his statement, dry labors showed a much higher percentage of long labor. There were 27 per cent of long labors; that is, over twenty-four hours, in our real dry labors. Dr. Beck also noticed in a few cases of funnel pelvis cases that there was a tendency for the labor to be more prolonged than either in the generally contracted pelves or in the normal pelves. Fifteen per cent of the funnel pelvis, when the dry labor proposition as an etiologic factor was eliminated, had long labors.

Dr. Beck said he did not induce labor in contracted pelves, and found in the toxic cases that more often than not the induced labor is prolonged.

In regard to the results in the conservative handling of these cases. In Dr. Beck's study there were 1138 cases, in which there occurred 79 prolonged labors. All but 13 of these delivered spontaneously. Some, of course, were in labor a long time, but the patients were not exhausted as a result of this, because when they grew tired they were given enough morphine so that they went to sleep. Sometimes they were given two periods of rest in the course of the labor. Forceps were used in only 6 cases. Two were delivered by breech extraction, and eight terminated by section; they were borderline types of contracted pelves.

While he had not gone through the chemical investigations Dr. Bailey recommends, he stressed the need for the taking of large amounts of carbohydrates from the very beginning of the labor, and insisted upon the patients taking repeated feedings.

### Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

### Selected Abstracts

#### Labor

De Garis: The Application of the New Definition of Normal Labor to the Clinical Study of Obstetrics. The Australian Medical Journal, 1926, ii, 6.

A new definition of normal labor as given by the writer is as follows: "A normal labor is one in which the uterine contractions act thoroughly efficient, leading in a short time to the spontaneous delivery of a healthy baby and causing but little or no distress or pain to the mother." The author believes that pain during labor is pathologic. She also considers that faulty diet may have an important bearing on the cause of pain during labor. Her theory further states that pain is probably the first indication of uterine inertia.

NORMAN F. MILLER.

Ko Chi Sun: Spontaneous Contractions of the Pregnant Human Uterus. A Preliminary Report. Bulletin of Johns Hopkins Hospital, 1925, xxxvi, 280.

Spontaneous contractions of the musculature of the pregnant human uterus have been studied graphically at all periods of gestation, and arguing by analogy with the lower animals and by the fact that spontaneous contractions were observed in the uterus of a six-month fetus, it must be assumed that the human uterus contracts rhythmically throughout life, certainly from before birth until after the menopause.

In pregnancy the contractions differ in various individuals in varying periods of pregnancy, labor, and the puerperium. Likewise, differences are noted according to the portion of the uterus from which the specimen is obtained, as well as according to the length of time it has been preserved outside the body.

The characteristic, passive behavior of the lower uterine segment has been demonstrated.

The various observations made may be offered in support of many clinical intra-vitam phenomena, such as the Braxton Hicks contractions, the after pains, secondary uterine inertia, tetanic contraction of the uterus in prolonged labor, ligneous consistence of the uterus associated with premature separation of the placenta, and the frequent occurrence of right occipito-posterior positions of the child.

• C. O. Maland.

Jerlov, E.: Does the Stimulus of Labor Arise in the Fetus? Acta Obstetrica et Gynecologica Scandinavica, 1926, v, 128.

In a series of experiments, the author found that the blood taken from the umbilical cord immediately after birth contains substances which promote the activity of a resected uterus of a guinea pig to a greater extent than does other blood even that from the mother. This finding is interpreted as indicating that the stimulus to labor under normal conditions originates in the fetus.

J. P. GREENHILL.

Wetterdal, P.: The Fixation of the Fetal Head During the Latter Part of Pregnancy. A Comparison Between Primiparas and Multiparas. Acta Gynecologica Scandinavica, 1925, iii, 297.

The author studied 250 primiparas and 250 multiparas in the obstetric clinic at Stockholm during the latter part of pregnancy. Only patients with occiput presentations and normal external pelvic measurements were selected. It was found that the fetal head was fixed two months before labor in about 25 per cent of primiparas and in about 20 per cent of multiparas. For each successive 10 days the relative numbers of fixed heads increased continuously, slightly more in primiparas. During the last three weeks it reached 55 to 57 per cent for all the cases. The author believes, therefore, that the mobility of the head during the last months of pregnancy does not necessarily denote a pathologic condition and that there is not much difference as regards this point in multiparas and primiparas. When labor pains begin the head becomes fixed much oftener in primiparas due to the different conditions of the lower uterine segment. The tonicity of the abdominal wall and the amount of liquor amnii do not seem to play any part in the fixation of the head except in extreme cases.

J. P. GREENHILL.

Guérin-Valmale and Loriot: Does the Uterus Descend Toward the End of Pregnancy? Bulletin de la Societé d' Obstétrique et de Gynécologie de Paris, 1925, xiv, 397.

It is the general belief that the uterus descends into the pelvis during the last weeks of pregnancy but the authors claim this is a misconception. They base their contention on the measurements of 420 women who had no abnormalities which might interfere with this study, such as polyhydramnios, placenta previa, pelvic tumors, twin pregnancies, etc. In this series the authors found a continuous rise of the uterus even to the very end of pregnancy. The height of the uterus remained the same for equal durations of pregnancy regardless of whether the head was movable or fixed. Descent of the fetal head does not cause descent of the uterus for the following reason: When the head is movable it has below it in the lower uterine segment a certain amount of liquor amnii; when the head descends the liquor is displaced upward so that the uterine height is not changed.

Toward the end of pregnancy patients usually say the uterus has dropped. What has actually happened is that the uterus has inclined itself forward, thereby relieving pressure in the epigastrium and giving the patient more freedom in respiration. The jutting forward of the uterus is due to the fact that as the uterus grows, it becomes harder and approaches more nearly the shape of a sphere. As this happens it recedes more and more from the spinal column, against which it rests in the early months. The phenomenon is more noticeable in primiparas because in them the uterus has more tonicity and is therefore harder. While the above holds true for the large majority of eases, there is a lowering of the uterus in a small percentage (about 6 per cent).

J. P. GREENHILL.

Bretz, M.: Axial Rotation of the Uterus During Labor. Monatsschrift für Geburtshilfe und Gynäkologie, 1925, lxix, 20.

A cesarean section was performed on a 21-year-old primipara with a contracted pelvis in whom the fetal head was firmly fixed in the right lower quadrant. The abdominal incision was made in the midline between the umbilicus and the

symphysis and upon opening the peritoneal cavity the right tube and ovary presented themselves. This condition was produced by a 180 degree rotation of the uterus toward the left side. The uterus could not be rotated back to the right side. Since the posterior wall of the uterus was the only accessible one the peritoneum on the posterior surface was incised transversely and stripped away and the uterus was incised longitudinally in the lower uterine segment and lower part of the fundus posteriorly. The child was delivered with forceps. After the uterus was closed, it spontaneously turned back to its normal position. The patient recovered.

This patient had no symptoms referable to the rotation of the uterus and absolutely no pain other than uterine contractions. The author could find no explanation for the rotation.

J. P. GREENHILL

## Weinzierl, E.: Indirect Determination of Cervical Dilatation According to the Schatz-Unterberger Method. Medizinische Klinik, 1924, xx, 1458.

The Schatz-Unterberger method of determining the amount of cervical dilatation depends on the height of the ring which exists between the fundus and the lower uterine segment, because the amount of dilatation of the cervix is influenced by the relationship which exists between the active, contracting part of the uterus and the passive, dilating portion. For normal cases the relationship between the cervix and the retraction ring is fairly constant but where there is some obstruction, the ring may rise very high while the cervix may dilate very little. The author studied 100 women in labor by means of this method. The abdomen was palpated not only between pains but also during pains and at the beginning of the study the results were checked up by rectal examinations. In nearly all cases the amount of cervical dilatation could be foretold by estimating the height of the retraction ring above the symphysis. In primiparas the ring was more pronounced than in multiparas. The method proved especially valuable where internal examinations could not be done as in cases where colpeurynters or metreurynters were used. The author found that the test was not only applicable in normal cases but also in abnormal ones, contrary to the findings of other writers.

J. P. GREENHILL.

## Koller, T.: The Importance of Rectal Examinations During Labor As a Prophylaxis Against Puerperal Infections. Archiv fuer Gynäkologie, 1925, exxvii, 1.

The author reports two series of obstetric cases, each consisting of 4917 cases in labor, the one group being examined only rectally and the other being examined vaginally at some time during labor. The percentage of cases in each group which showed a rise in temperature one or more times after delivery was practically the same. Neither was there any difference in the mortality rate of the two groups. There was, however, a marked difference in the incidenc of perinterine wound infections in the two groups. In the group examined only rectally, this incidence was 0.05 per cent, while in the group examined vaginally this condition was found in 0.34 per cent of cases, which is six and one-half times as frequently as in the other group. The author believes that this difference is due to the fact that in the cases examined vaginally, organisms from the vulva are carried up into the cervical canal by the examining finger and so into the uterine cavity. Rectal examinations only, of course, are a prophylaxis against the carrying of organisms from the vulva into the uterine cavity and, therefore, is a prophylaxis against perinterine infections during the puerperium.

RALPH A. REIS.

Belosor: The Anatomic Basis of the Rupture of the Membranes in Normal and Premature Births. Zentralblatt für Gynäkologie, 1925, xlix, 644.

After histologic examination of the amnion in 50 cases the writer comes to the conclusion that hyaline degeneration of the amnion is a physiologic process tending to simplify the rupture of that membrane during birth. This degeneration increases with the age of the fetus, reaching a maximum between the eighth and tenth months. Where the fetus has been born with intact amnion the degeneration is noted to be less marked. Rupture of the sac is due not only to contraction of the uterus but also to the fragility of the tissues.

LITTLE.

Gold, Victor: Diagnosis of Ruptured Membranes. Zentralblatt für Gynäkologie, 1927, li, 1491.

Due to the alkalinity of the amniotic fluid the chemical reaction of the vaginal secretion changes from acid to alkaline after the rupture of the membranes. By testing the vaginal secretion with lithmus paper it is possible to determine with accuracy whether the membranes have ruptured or are still intact. Sources of error include the alkaline reaction of bloody secretion, of antiseptics, soap, and the acid reaction of acid urine.

GROVER LIESE.

Rosenstein, W.: Cervical Lacerations in Spontaneous Labors, Monatsschrift für Geburtshilfe und Gynäkologie, 1927, lxxvi, 265.

The author believes that strong bearing-down efforts during the first stage of labor favor the occurrence of cervical lacerations. Likewise pressure on the fundus externally before the cervix is completely dilated is harmful. Where bleeding or other evidence of cervical laceration is present, the cervix should be carefully inspected and repaired if tears are present. Just as unrepaired or badly repaired perineal lacerations must subsequently be operated upon so do unsutured or badly sutured cervical lacerations later require plastic operations.

J. P. GREENHILL.

Hinselmann, H.: The Damage of the Lower Uterine Segment in Spontaneous Deliveries, Based Upon Systemic Colposcopic Examination in the Puerperium.

Monatsschrift für Geburtshilfe und Gynäkologie, 1926, lxxii, 43.

Hinselmann examined the vaginas of a large number of patients during the puerperium to see the damage labor had produced. Nearly all the injuries were in the cervix and in the introitus. Isolated lacerations in the vagina were rare and most of them were in the middle third of the vagina on the left side. A frequent finding was injury to the vestibule, especially in the region around the urethra and clitoris and these were in the form of bruises. They were most likely due to the strong pressure of the fetal head as it passed through the outlet. Forced protection of the perineum greatly increased these injuries.

Lacerations of the cervix were not very common. The tears were often multiple and were usually ½ to 1 cm. long. Most of them looked clean. A not uncommon bruise was found in the anterior lip of the cervix about ½ to 1 cm. above the external os. The author believes that all puerperae who do not have fresh repairs should have a vaginal examination with a colposcope.

J. P. GREENHILL.

Howat, R. K.: The Perineal and Pelvic Floor Muscles in the Second Stage of Labor. British Medical Journal, 1927, i, 759.

The teaching, express and implied, that during the pains of the second stage the perineal muscles are in a state of contraction seems opposed to some obvious phenomena of labor. A little consideration of the conditions of the second stage compared with the effects of contraction of perineal and pelvic floor muscles will serve to indicate the difficulty of accepting this teaching.

It appears that during the pains of the perineal "management" stage the muscles of the pelvic floor and perineum are stretched, as indeed are all the perineal tissues. They are not contracted, and therefore it is not true that their contraction opposes delivery and favors laceration.

F. L. ADAIR.

Hall, Rosetta Sherwood: Posture in the Preservation of the Perineum. China Medical Journal, 1927, xli, 797.

The author's attention has been called to the comparatively few torn perineums among Korean woman who have visited the gynecologic departments in Seoul and Chemulpo, and also in Pyong Yang. Among some 3000 patients, about 75 per cent were delivered upon their knees, a Korean custom. Of these 55 per cent had no tears; the remaining 20 per cent were torn a little, and they usually gave a history of a too rapid labor. Of the entire number, 25 per cent were delivered with the mother lying upon her back, and they were almost always torn, some quite badly; only 3 per cent of the number delivered that way had no tear. With a few exceptions those delivered upon the back had been attended by either a midwife or a physician. Of course, they may represent more difficult or abnormal cases. It is stated that 20 to 30 per cent of primiparae receive a perineal tear in hospital practice in the United States.

From observation the author believes that delivery in Sim's position is but an adaptation of the Korean custom to better suit our beds or delivery tables. In their homes, upon the Korean floors, the midwife prefers to deliver patients upon their knees. It is the ordinary position of the pelvis in the labor of four-footed animals. Perhaps more research in the customs of primitive peoples will reveal that Korea has not been alone in this safe custom.

C. O. MALAND.

Abel: On The Combating of Weak Labor Pains. Deutsche Medizinische Wochenschrift, 1925, li, 1953.

Abel has tried the many German and English preparations from the pituitary gland and finds that they are not uniform in their action on the uterine musculature. He has decided that "Pituigan Forte," made by Henning in Berlin, is the best. He uses it to stimulate the uterine contractions when they are failing in any case, with the provision that if the head is not in the pelvis or there has been an early loss of the amniotic fluid, the cervix must be fully dilated before "Pituigan" is given. He has also used it in functional bleeding from the uterus with excellent success.

PEMBERTON.

Bell, W. Blair: Infundibulin; Indications for its Use in Surgical and Obstetrical Practice. British Medical Journal, 1925, i, 1027.

Infundibulin or pituitrin is of use in three types of obstetric conditions: For the induction of labor; for uterine inertia; and at the end of the third stage of

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labor. For the induction of labor it is indicated first, to bring about the expulsion of the dead fetus; second, in postmaturity to obviate the possibility of disproportion between the maternal and fetal parts; and third, in antepartum hemorrhage either accidental or from placenta previa when used with other methods such as rupture of the membranes. To induce labor 0.5 cm. is given 4 times daily for about 3 days in order to bring about uterine contractions.

In a case of physiologic primary inertia in a primigravida pituitrin should not be given, but rather a sedative. Pathologic primary uterine inertia usually occurs with multiparity and is normally due to an insufficient amount of so-called pressor substances in the blood to bring about normal and forceful uterine contractions. In this type of case pituitrin should be given.

In secondary uterine inertia we have a fully dilated cervix but normally an exhaustion of the uterine musculature with pains too weak to bring about the spontaneous delivery of the child. In this type of case pituitrin is useful but must be employed with caution and the patient watched closely.

At the end of the third stage, following the expulsion of the placenta, pituitrin should be given followed by the administration of ergot. It should be given after cesarean section after the uterine wound has been sutured. It is also of use for subinvolution of the uterus.

Pituitrin is a powerful drug which is of great benefit to the obstetrician when used with caution and by one who understands its indications and limitations.

ADAIR AND SICHEL.

#### Bey: The Use of Pituitrin in Obstetrics. Bruxelles Médical, 1925, v, 1183.

Bey feels that in pituitrin the obstetrician has a valuable adjuvant which, when used intelligently, carries with it no danger. Its use should be reserved for those cases where, after complete cervical dilatation, the presenting part having descended well into the pelvis, secondary inertia develops. It should never be used where disproportion between the pelvis and fetus exists. If these contraindications be observed the necessity for forceps will be reduced 75 per cent without danger to the fetus. He emphatically asserts, however, that the abuse of pituitrin should be energetically combated.

THEODORE W. ADAMS.

## Scott, R. A.: Pituitrin and the Third Stage of Labor. Surgery, Gynecology and Obstetries, 1926, xliii, 651.

In order to estimate the value of this procedure, the records of 1000 consecutive cases in which pituitrin was used were reviewed and the results compared with 1000 consecutive cases in which pituitrin was not used.

Pituitrin was administered inframuscularly in dosage of one-half c.c. at the beginning of the third stage of labor and it was found: (1) It definitely shortened the third stage of labor. (2) It lessened the amount of blood lost in the third stage of labor both in spontaneous and operative deliveries. (3) It lessened the number of cases of postpartum hemorrhage, and (4) diminished the frequency of retained placentas due to constriction ring.

WM. C. HENSKE.

### Oppenheimer, W.: Subcutaneous Emphysema of the Parturient Woman. Monatsschrift für Geburtshilfe und Gynäkologie, 1925, lxx, 243.

The occurrence of subcutaneous emphysema during labor is rare, there being only 9 case reports in the German literature since 1875. Kosmak was able to

collect 77 cases from the entire literature. Oppenheimer reports a case of a primipara in whom subcutaneous emphysema occurred after a spontaneous labor which had lasted thirty-four hours. About three hours after labor the patient complained of pain in the neck and face and these parts of the body were found to be definitely blown up. Crepitation was easily obtained. The condition soon extended over the shoulders and down the chest to the nipples. Most of the emphysema disappeared after two days but some was still present on the eighth. Aside from mild pain there were no symptoms at all. X-ray showed normal lungs. The emphysema in this case was due to strong bearing-down pains after a long labor. The baby was large and the pelvis was flat.

Nearly all the patients whose cases were reported in the literature were primiparas. The mechanism of the origin of the subcutaneous emphysema is as follows: In a primipara strong bearing-down pains produce increased pressure within the alveoli of the lungs. One or more alveoli rupture and the air escapes into the interstitial tissue, producing an interstitial emphysema. With each bearing-down effort more air becomes interstitial and is forced along the branches of the bronchioles toward the hilus. From the hilus the air easily escapes into the loose mediastinal tissue high up, and so reaches the subcutaneous tissue in the region of the jugular vein or the median part of the clavicle. From here the air spreads further in all directions. Thus far there has been only one death reported from subcutaneous emphysema in a parturient woman.

J. P. GREENHILL.

## Moyes, R. E.: Full-Time Pregnancy in Bicornuate Uterus. British Medical Journal, 1925, ii, 256.

The author describes the case of a primipara, twenty-eight years old, with a long labor (twenty-four hours), position O.L.A., and having a tumor on the left half of the uterus. The author waited one and one-half hours for the placenta, then decided to do a manual removal. He found a muscular septum dividing the uterus with the placenta adherent on the right side. Recovery was uneventful except for profuse, foul lochia for one week.

ADAIR AND HACKETT.

#### Vidal: Tachycardia and Arrythmia Following an Injection of Pituitary Extract During Labor. Bulletin de la Société d'Obstétrique et de Gynécologie, 1928, xvii, 35.

A secundipara was given a hypodermic of one-half e.e. of pituitary extract after the cervix had been completely dilated for a half hour, and the pains had ceased completely. Instantly and before the uterine contractions reappeared, the patient's pulse rose to 140-150 and was very irregular. Her face became extremely pale and anxious. Then the uterine contractions began and the child was expelled alive. The arrythmia disappeared at once but the tachycardia persisted and did not diminish until 12 hours after labor. The puerperium was normal. Examination of the patient's heart revealed no abnormality, her blood pressure was normal and there were no hyperthyroid symptoms. The sudden appearance of the alarming symptoms after the injection of the pituitary extract leads to the belief that the injection was not made in the muscle but in a vein. The prolonged tachycardia, however, remains unexplained.

J. P. GREENHILL.